Australian Model Engineering

January-February 2001

Issue 94

$6.15* (inc. GST)

NZ$7.50* (inc. GST)

LOCOMOTIVES, TRACTION & STATIONARY ENGINES, BOATS, WORKSHOP, PRODUCTS, CLUB NEWS & EVENTS, REVIEWS

In This Issue:

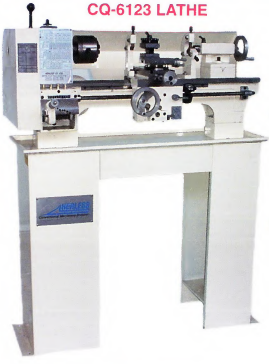
- ☑ *RED FRED* — A Radio Controlled Rail Motor
- ☑ 2000 Traction Engine Rally
- ☑ Universal Lever Type Dial Gauge Holder

9 770819 473012 01

Print Post Approved, Publication No. PP228582/00001

*Recommended Retail Price

CQ-6123 LATHE

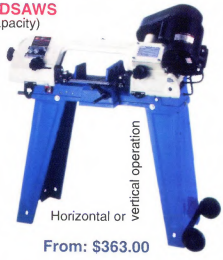


NEW MODEL

Now with splash guard, chip tray and optional stand ($220)

$1430.00

115 BANDSAWS
(115mm capacity)



From: $363.00

ZX-40 MILL DRILL

Geared head and 3MT Spindle

$2365.00

Also available (not pictured)

ZX-45 MILL DRILL
Dovetail column, Geared head, and 4MT Spindle

$3289.00

ZX-7550 Series MILL DRILLS

ZX-7550
Vertical Milling Machine
C/W: Square slides,
Coolant system,
Power feed,
Collet set,
ISO-30 spindle,
6" Swivel base milling vice
plus more...

$4290.00

VERTEX ACCESSORIES

Rotary Table

Dividing Head

Clamp Kit

4" Dividing head . .	$510.00	3MT 8 piece Collet Chuck set	$247.50
5" Dividing head . .	$687.50	5" Swivel Base Mill Vice . . .	$271.20
6" Rotary table . . .	$357.50	52 piece Clamping Kit	$124.20
8" Rotary table . . .	$541.00	Coolant pump kits from. . . .	$250.00
7 piece HSS Toolkit	$110.00	9 piece TCT kits	$137.50
Dial Indicators . . .	$33.00	Magnetic Bases	$33.00

Please mention this advert to receive these special prices

2001
VIP Catalogue
OUT JANUARY
Phone / Fax / E-mail
for your copy.

All prices include 10% GST

TOLL FREE PHONE NUMBER: 1800 249 049

HMC
Herless Machinery Corporation

Melbourne Head Office
2099 Prices Highway
Clayton, Vic. 3168
Telephone: (03) 9562 8866
Facsimile: (03) 9562 8329

Perth Office
Unit 2/15 Brennan Way
Belmont, WA, 6104
Telephone: (08) 9479 6066
Facsimile: (08) 9479 6055
Email: machines@herless.com.au

Sydney Office
Unit 4/99 Silverwater Rd.
Silverwater, NSW, 2128
Telephone: (02) 9748 3222
Facsimile: (02) 9748 1829
Website: www.herless.com.au

ISSN-0819-4734
Publisher: Australian Model Engineering Pty Ltd.
ACN 008 627 825
Australian Model Engineering is published six times per year at two-monthly intervals. January is the first issue for the year.

Subscriptions
An annual subscription to AME costs just $35.20 (incl. GST) within Australia. NZ is AUD$44; all other countries, AUD$54 air. You can pay by cheque, money order, or overseas bank draft. You can also use your Bankcard, MasterCard or VISA credit card. **All Mail to:**

PO Box 21, HIGGINS, ACT, 2615, AUSTRALIA
Phone/Fax : (02) 6254 1641 or + 61 2 6254 1641 from overseas

Printing and Distribution
Proudly printed in Australia for the publisher by Pirie Printers Pty Ltd, 140 Gladstone Street, Fyshwick ACT 2609
Australia Post Print Post Approved.
Publication No. **PP228582/00001**
Distribution is by subscription, through hobby supply houses and related-interest sales outlets worldwide, and also by Gordon and Gotch Limited through newsagents in Australia.
North American agent:
Wise Owl Worldwide Publications
1926 S. Pacific Coast Highway, Suite 204
Redondo Beach, CA 90277
Telephone: 310-944-5033

January-February 2001 Issue 94

Contents

Front cover
Rally organiser Gordon Blake from Inverell with his 4½" scale Burrell traction engine pauses in front of the lake at the 2000 Traction Engine Rally. Turn to page 36 to see more pictures of the Rally.
Photo: Phyl Oliver

http://www.ameng.com.au

Crew

Managing Editor
David Proctor
Phone & Fax:.....(02) 6254 1641
(phone: leave message before 3pm)
e-mail:...amemag@bigpond.com

Contributing Editors
Brian Carter, John Cummings, Dave Harper, Clive Huggan

Editing Assistance
Murdoch Findlay, John Oliver

Draughters
Dave Adams, Craig Belcher, Jim Gray, Peter Hall, Clive Harnwell, Rod Heslehurst, Peter Kerville, Kent Learned, Peter Manning, Peter O'Loughlin, John Podmore, John Shaw, Tim Smith, Rex Swensen, Paul Trevaskis, Zenon Zalewski

Typing and Distribution
Phyl Oliver

Contributors
Stan Allison, Les Banhidi, Cyril Cannell, Robert Carlisle, John Cummings, Peter Dawes, Dave Giles, Murray Lane, Peter Lukey, Doug Mellor, John Oliver, Ian Smith, Bob Weir

Advertising
Brian Carter
Phone: .....(02) 9351 6328 (BH)
(02) 9649 5301 (AH)
Fax (24hrs): ...(02) 9702 0054
e-mail:.... brian@ameng.com.au

Subscriptions
Mandy Proctor.....(02) 6254 1641

Back Issues and AME Retail
Phyl and John Oliver
PO Box 21, Higgins ACT 2615
Ph/Fax .....(02) 6292 1938
email: jpoliver@webone.com.au

Area Representatives
Western Australia
Doug Baker .....(08) 9341 1630
South Australia
John Wakefield ..... (08) 8362 3269
Victoria
Bill Taylor .....(03) 9458 3404
Tasmania
Jim Gray ..... (03) 6394 7124
ACT
Gerardus Mol .....(02) 6207 4011
New South Wales
Barry Glover .....(02) 4284 0294
Queensland
Dave Harper .....(07) 3261 1140
New Zealand
Murray Lane .....(09) 534 8396

Published by
Australian Model Engineering Pty Ltd
P O Box 21, Higgins ACT 2615
Australia

Comment

The end of an era

After many years of active involvement in the *Australian Model Engineering* magazine, both in the production side and administration, Neil Graham has decided to call it a day.

Neil's connection with AME began back in 1990 when the original AME magazine ceased production as a result of changing priorities of the original editor. Realising that the magazine had come to be an important link between members of the model engineering fraternity as well as a great medium for the disemination of ideas, Neil was of the opinion that the magazine was worth saving. To back his convictions he was prepared to dip into his own pocket as well as spearheading a rescue bid which saw several like-minded modellers also dig into their pockets and assist in getting AME up and running again.

The magazine reappeared with issue 33 in November 1990 with Neil in the Editor's chair. He continued in this role until mid 1993 when a change in employment meant that he no longer had the time available to put into the production of the magazine and with issue 50 the reins were handed over to Brian Carter. During Neil's stewardship, AME grew to become a self-supporting publication with readers throughout Australia and overseas by means of subscriptions as well as being available through newsagents for the first time. The standard of the magazine was lifted to the position where, for the first time Australia had a quality glossy magazine catering for model engineers which was as good as any elsewhere in the world.

After he handed over to Brian, Neil's involvement with the magazine has continued by way of contributions such as part of the 422 class series and over the last three years compiling Club Roundup. As well as that he has been involved mostly behind the scenes as a director and looking after the administration side of the company.

In the years that he has been involved with AME, Neil has made an enormous contribution to the model engineering hobby in Australia and this contribution was officially recognised at the 1994 AALS Convention when he was presented with a Certificate of Appreciation. One could say he has made his mark!

Neil's decision to retire as a director and as a contributing editor was again, in part related to employment. Currently he is undertaking a university course to upgrade his qualifications in these days where no job is secure, even that of a qualified marine engineer. The time constraints of study and "having a life" have brought him to the conclusion that he can no longer put in the level of effort he has always expected of others (as well as himself), though no doubt he will continue to assist his wife, Denise on occasions with the accounts.

On behalf of the AME crew and model engineers everywhere, Neil, many thanks from all of us (and if some day you find you have some spare time on your hands ....)

David Proctor

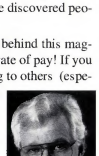
Join us in a great hobby!

If this is your first issue of *Australian Model Engineering*, welcome!

In successive issues we cover many topics centred on that wonderful process of model engineering — alias *tinkering*.

If you're new to model engineering as well as to our magazine, you'll benefit from getting together with other model engineers — we're good at sharing ideas and saving each other money! If you don't have any contacts, start by looking in Club Round-up to find a club that's near to you. Many of our readers have discovered people with similar interests literally just around the corner.

Helping other model engineers is the simple idea of the volunteers behind this magazine. Our readers write items for us — for the same (non-existent) rate of pay! If you have ideas, opinions or techniques that you feel would be interesting to others (especially from the newcomer's angle), please drop us a line. We can send you a useful guide and help with preparing artwork or editing.



I hope you'll enjoy the great fellowship that makes our hobby special, and that you'll support our advertisers — after all, they help pay our bills!

David Proctor
Managing Editor

HAFCO Workshop Equipment

DIGITAL VERNIERS

- Easy read electronic display
- Zero reset button
- Metric & imperial measurement
- Auto cut out saves battery life
- Battery supplied
- Guaranteed accuracy

150mm/6"	SALE PRICE	$89
200mm/8"	SALE PRICE	$109
300mm/12"	SALE PRICE	$175

HM30 MILL DRILL

- Heavy Duty 2HP 240V TEFC motor
- Weight 300kg
- 3m spindle
- Chuck & vice supplied
- Table 810mm x 240mm
- Top quality finish

OPTIONAL STAND

BENCH LATHE

- 4" Centre height
- 20" Between centres
- 240V, 6 speed, with 2 chucks, steadies and quick change gearbox

NOW WITH SPLASH TRAY

BS5 METAL BANDSAW

- 125mm capacity • 240V
- 4-speed auto cut out
- Cast iron construction

NOW! 5" (125mm) capacity

SANDBLAST CABINET

- 300 x 450 x 550mm steel cabinet
- Includes light, sandblasting gun with ceramic nozzle & gloves

$249

AUTO PARTS WASHER IDEAL FOR MOTOR TRADE

- Large 90 litre solvent capacity
- 240 Volt pump gives output of 220 litres per hour
- Tank 900 x 500 x 250mm
- Weight 35 kg

$179

Small bench model **$99**

FREE!

80 PAGE 2001 PRICED CATALOGUE OUT NOW! RING, WRITE OR FAX

HAFCO DIGITAL INDICATORS

IDEAL FOR LATHES & MILL DRILLS

- **Accuracy 0.01mm • mm/inch switch**
- **auto cut-off (30 mins) • magnetic**

DIGITAL COUNTERS

1 Axis	Battery operated	**$163** (D650)
3 Axis	240V or battery	**$361** (D651)

DIGITAL SCALES

200 m	**$97** (D652)	800 mm	**$328** (D658)
500 mm	**$174** (D655)	1000 mm	**$416** (D660)

DIGITAL READOUT to suit Mill Drills Inc. 2 Scales (200 & 500mm) and 1 Counter

MINI METALMASTER RANGE

Ideal for model makers and light engineering

VARIABLE SPEED

(M150)

HM-10 MINI MILL DRILL

- Electronic variable speed spindle 100 - 3000rpm
- 2-speed gearbox for increased torque
- Travels (xyz) 228 x 100 x 215mm
- Head tilt to 45° in both directions
- 3mt spindle • 240V motor

AL-60M MINI LATHE MILL DRILL

- Same mill/drill head as HM-10
- 125mm centre height, 550mm between centres
- 20mm spindle bore • 6 speeds 125-2500rpm
- Metric and imperial thread cutting
- 500w (3/4hp) 240V lathe spindle motor
- INCLUDES: 100mm 3-jaw chuck, milling table, drill chuck, metric & imperial thread-cutting gears

• ALL PRICES INCLUDE GST •

HARE&FORBES MACHINERYHOUSE

Established 1930

SUPPLIERS OF NEW & USED MACHINERY AND WORKSHOP EQUIPMENT

NSW: Cnr James Ruse Dr & Windsor Rd NTH PARRAMATTA **Ph: (02) 9890 9111** **Fax: (02) 9890 4888**

QLD: 550 Kessels Road, MACGREGOR 4109 **Ph: (07) 3849 1888** **Fax: (07) 3849 1414**

W.A: FIORA MACHINERY SALES **Ph: (08) 9356 1811** **Fax: (08) 9451 1323**

NOTE: WA prices may be higher due to freight costs **ME122000**

RM 55 — *Red Fred* the Railmotor

Story and photos by Dave Harper

Well, *Red Fred* is complete, and turned quite a few heads at the AALS Convention over Easter at Warner in Queensland. I feel it's a good time now to put down my thoughts on how and why this model came about. (**Photo 1**)

I'm a newcomer to the engineering side of model making, but have spent most of my spare time building model aircraft , boats and OO scale trains for forty years or so. I've always had a fascination with railmotors, and even built a OO scale brass kit of a GWR steam railmotor around twenty years ago.

I first saw *Red Fred* outside the Redbank workshops of QGR probably ten years ago, and thought then that I'd like to build a model of him. It was about three years ago that I decided to take the plunge and build the model.

However, I also decided at this time that I wanted to build an accurate scale model, and to furnish the interior as completely as I could. This meant that it would be too fragile to ride on, like other similar models I'd seen. It also quickly became obvious that there would be little room available to fit motors and batteries if I wanted to put seats inside it!

The scale of the problem

Having Neil Mackenzie living just a few streets away turned out to be a great blessing, for when I mentioned the idea to him, he immediately suggested I go for 5" gauge, rather than the 3½" gauge that I was considering. This was because 5" gauge is the most popular size in Queensland, and probably Australia, and it also meant that the model could be built at

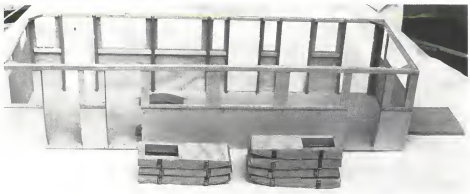


Photo 3

1/8 scale, or 1½" to the foot.

Neil also dug through his collection of the *Sunshine Express*, the ARHS (Australian Railway Historical Society) Queensland journal. In there was a whole series of articles on *The Rail Motors of the Qld Railways* by J W Knowles, (ARHS Bulletins nos 357, 358, 360 and 362, July - Dec 1967).

This excellent series of articles traces the whole history of the QR Railmotors, and provides dimensioned outline drawings for many of them. I also learnt from Neil that *Red Fred* was now housed at the Rosewood Railway Museum, near Ipswich, Qld, which is run by the ARHS.

Studying the articles, I realised that the railmotors nearly always towed a trailer of some sort behind them. This led me to the idea that a box wagon would be the ideal camouflage for hiding the motor, batteries and the radio control gear that seemed the obvious way to control the model. The fact that no-one appeared to have done this in 5" gauge was an added incentive.

In the meantime I needed a lot more detail before I could even start to sketch out the construction of a model. I contacted the people at Rosewood, and they were quite willing for me to come over and photograph *Fred* anytime I liked. I ended up making several visits and photographing and measuring the 'motor' from head to tail.

Building the body

This enabled me to go ahead and build the body, which was not much different from model boat building. I used 10mm exterior grade ply for the floor, to give a solid base to build on. The frames were cut from some beech that I'd been saving for years, the sides were skinned with 1mm ply over spruce stringers. The window apertures were formed by fitting ply panels above and between the windows. I also decided that the doors should open as

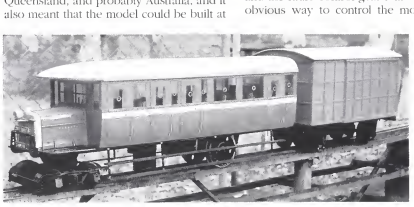


Photo 1

Photo 2

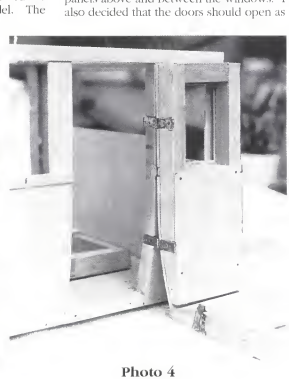


Photo 4

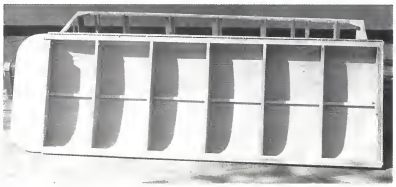


Photo 5

per the full size, so I had to build 7 doors, using more precious beech, and hang them on brass hinges. These had to have extensions soldered on to allow for the tumblehome, and were all set into their own rebates. Shaping and fitting the doors was a good exercise in joinery. **Photos 2, 3 and 4** show the body during construction.

The door handles were made up from brass strip. They were silver soldered to 6BA brass screws that run in brass tubes in the doors. The screws have latches locknutted on the inside. The grab handles are 2mm brass wire silver soldered to brass plates each end and pinned in place with a touch of epoxy glue. Jigs were made to bend the handles accurately and to drill the mounting holes.

The windows are polycarbonate sheet about 1mm thick, glued in place with a special PVA glue sold for attaching model aircraft canopies. They weren't fitted until the painting was completed, naturally.

The white circles on the windows had me puzzled for a time. it appears that, as first built, these railmotors had no windows fitted at all. When they were glazed later on, it was felt desirable to put something on the windows to remind passengers not to try sticking their heads through them! On the model they are made from cloth reinforcing rings for loose leaf folders, carefully cut out with a wad punch to leave a narrow ring to stick on each window. I did waste a few!

The roof

The roof was built as a separate unit, using 4mm MDF strips pinned and glued onto formers of the same material. This was basic model boatbuilding, and presented no problems. The original has some sort of fabric covering the roof, so this was simulated using white calico fabric. My wife, Sandy, gave valuable assistance in this part of the job! The calico was glued on using Bondcrete® and then given a couple of coats of white acrylic paint. I have to say that we achieved a better finish on our roof than they did on the full-size, which has numerous wrinkles on the front section.

The roof is made removable, and is held on with a piece of aluminium angle at the front and a latch at the rear (**Photo 5**).

Seats and interior

The original seats have deep leatherette upholstery with many sewn lines in them. I decided that it would be impractical to try simulating these, and settled for carving the basic cushion profiles from pine and covering them with a fine leatherette type of fabric.

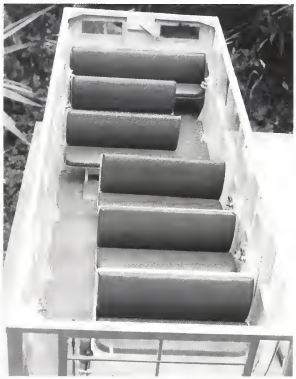


Photo 6

These 'cushions' were screwed onto seat frames made of 1/8" ply. Wooden blocks under the seats enabled them to be attached with screws up through the floor. There was some fiddling to fit the seat that goes over the rear wheel arches.

Photo 6 shows the interior with seats fitted. Note the staggered aisle.

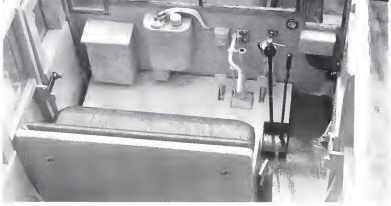


Photo 7

Photo 8

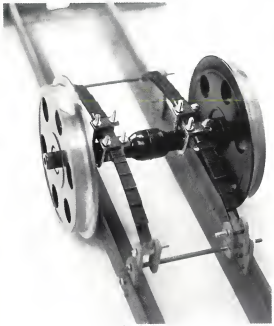


Photo 9

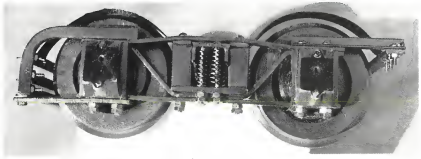


Photo 11

Driver's controls

The controls in *Red Fred* are a strange mixture of automotive and railway fittings. The foot pedals and gear lever are as per the original AEC truck, as is the hand brake. Then there is the Westinghouse brake lever and gauge, a crude electrical panel and what I believe is a fuel header tank for the engine. The throttle lever is pivoted on the firewall and operates a Bowden cable, all a bit fiddly to model.

There is also a second lever, possibly a brake, and a fire extinguisher on the end of the drivers seat.

All these items were fabricated from wood, brass wire and other bits and pieces, and resulted in quite a presentable reproduction of the original (**Photo 7**).

Bonnet and radiator

These two items also took a lot of figuring out. The radiator was built up from MDF and ply with 14 SWG wires to represent the cooling tubes. The filler cap was silver soldered up from bits of brass carved to represent the cast alloy original.

The bonnet and side boards were made from tin can material (we drink lots of Milo) and the louvres were formed as follows: the line of the cut edges was scribed and then cut with a fine chisel on a lead block. The end of a piece of 1" x $\frac{1}{8}$" steel was ground to the shape of the louvre, and tapped onto the tinplate over a carved wooden mould. It took a few practice runs to work out the process, but then it was no great problem. Each louvre was cut and formed in turn.

The two halves of the bonnet were formed to shape and riveted to a piece of piano hinge at top centre. Some square section copper strip was soldered around the edge and along the side hinge line. The lifting handles were made from large press studs with brass discs soldered over the centre hole, then cut in half. I got two for the price of one! Little brass strip hooks soldered on keep the hold down springs in place. These actually hold the bonnet on (see **photo 8**).

Other fittings

There are several boxes hung under the body and these were easily made from timber. The headlight gave me cause for much thought, as I originally wanted to make it operating. However, it's really too small to fit any available torch reflector, and I finally used a plastic acorn off the end of a curtain rod to give me the main shape. A front section was turned from aluminium and a clear lens fitted. A coat of silver paint and a brass strip mounting bracket resulted in a reasonably accurate headlight, even if it doesn't work. As I don't plan to run him at night, I can live with that.

The running boards are made from timber strips bolted to brass brackets. They are rather vulnerable, and tend to get bent out of shape while handling if I'm not careful! They are a very important feature visually, though, being very prominent on the full size *Fred*.

Painting

Getting the right colour paint was proving a problem until I mentioned it to my good friend Kel Ayling. He is a keen restorer of QR vehicles at the Queensland Pioneer Steam Railway, at Swanbank, and immediately offered to get me some of the paint they use on their carriages. This fixed not only the exterior red but the right shade of cream for the inside too! The metal parts were primed and painted using spray cans, likewise the radiator, running boards etc. All the above points are best seen in **photo 1**

How to make the running gear?

All the while I was building the body, I was trying to work out how I would tackle the running gear. I had no lathe at that time, and I didn't want to rely on friends like Neil to do all the turning for me.

Finally, circumstances allowed me to

Photo 10

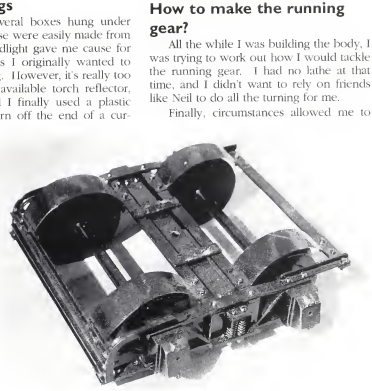


Photo 12

contemplate buying a lathe, and a Myford ML10 was advertised locally at a price I could afford at just the right time. This was a great step forward, especially as the lathe came with a vertical slide, which meant I could do basic milling on the lathe as well. The lathe had a pretty hard life but fortunately I live near Minitech, who were able to supply me with several screws and other odd parts to put the machine back into good order.

I purchased a set of QGR axlebox castings from Hobby Mechanics, and my first machining efforts were on milling these into a finished shape! This was a pretty laborious job, but I was pleased to find that my RAF training of 40 years ago came back to me, aided by Sparey's excellent book, *The Amateur's Lathe*.

The bogie wheels were plain discs, and Ernie Winter was able to supply cast blanks for those. The large rear wheels were a different matter, and I spent a long time wondering how to tackle them. In the end I settled for buying some slices of aluminium bar which I carved into some semblance of the originals.

These were fitted with two ball races in each wheel and mounted on 8mm screws which fitted into the back axle. On the full size *Fred*, this is the original truck back axle and differential. I turned a rough likeness out of some 1" brass rod, and drilled and tapped the ends to take the 8mm screws holding the wheels. As these had to be left slightly loose to avoid binding the bearings, the screws themselves are locked with a grubscrew into the axle.

The rear leaf springs were made up of many layers of 12mm x .9mm spring steel strip. These were rolled into roughly the right curve before cutting them to length. Even after doubling the number of leaves the springs proved too soft so rubber blocks were fitted above the axle each side to take the weight. At least the springs keep the wheels on the track! **Photos 9 and 10** show the back axle and spring assemblies. The front item in photo 10 is one of the centre buffer/couplings.

The front bogie had me puzzled for quite a while until I was fortunate enough to acquire a copy of an original QGR drawing of the bogie. It turned out to be a bar-framed type, with four coil springs each side. Having taken several photos of the original, I was able to work up drawings for my 5" gauge version, using cast iron axleboxes of the right QR pattern as mentioned above. The frames were fabricated from 10mm x 3mm steel strip which was cut from the sheet for me by a local supplier. Unfortunately this put a twist into each strip which was very difficult to get out! Eventually I was able to make each side frame to fit the axleboxes, all bolted together. (**Photo 11**)

I think *Red Fred* must be unique in having mudguards over the bogie wheels — or maybe it's a QR peculiarity. Anyway, what with these and an angle iron bullbar across the front, there were 35 separate pieces in the bogie before it was finished! They all had to be dismantled for spraying, one coat of primer and one of satin finish black from spray cans, then reassembled. (**Photo 12**)

This was also my first attempt at turning cast iron wheels, so my learning curve was really going up. Using the AALS narrow gauge standards I achieved a reasonable result, and Loctited the wheels onto the axles. It was good to have Neil Mackenzie handy to call on for help on odd occasions. One time was when I was pressing the bearings into the rear wheel, using my vice for a press. I got one halfway in and couldn't get it any further. A panic call to Neil saw me racing around to his place where his 10 ton hydraulic press just managed to get it home before the Loctite went off completely. At least I'm pretty sure that bearing won't work loose!

The chassis

The chassis was fabricated from 20mm x 20mm x 3mm angle iron, welded together by my friendly neighbour and his MIG welder. Spring hangers were made from 3mm steel and screwed on, then the back axle and springs could be assembled. The axle is held to the springs by U bolts as per the full size. These were made from $\frac{1}{8}$" brass rod cut to length and threaded $\frac{1}{8}$" Whitworth each end. They were then bent into the U shape around a suitable bit of bar. Fitting them together with the clamping plates was a real fiddly job, but finally they all went together. Each set of leaf springs was held together with clamping strips made from steel strapping cut down to about 4mm width. These were then bent around the springs and crimped up with pliers. The shackle eyes on each end of the springs were turned from brass rod and silver soldered in place. Making the springs in this way saved me from having to drill holes in the spring steel and also from having to bend it around to form the shackle eyes. I'm very grateful to Eric Abbott for this tip. **Photo 13** shows the chassis assembled, before the rear springs were beefed up.

A final item I made up was a transport board. This was simply made from plywood with pine rails glued and pinned on, with a screw hook at each end for tying down. I keep thinking that I must figure a better tie-down system than two bits of clothes line, but I haven't come up with a better idea yet. **Photo 14** shows *Fred* tied down and ready to go — I've since found that it's easier to tie down using the buffer/coupling than the rear axle. I find that the board stays put quite well on the carpet on my van's floor. To set up on the track the whole thing is placed on the track. *Fred* is untied, and rolled off the board onto the track. A similar procedure works for the A wagon, which will be covered in a separate article.

I'd like to express my thanks to all the people at ARHS Rosewood for their patience and understanding, and to Neil Mackenzie and Ken Saunders for their patience in answering all my questions.

For those people that have asked for working drawings — hard luck! Like most scratch-builders I make drawings as and when I need them, and they contain just as much information as I need at the time. They also end up torn and grubby. As any writer of construction articles will agree, the effort required to produce a set of working drawings is nearly as much as that required to build the model. I'm happy to supply copies of the original outline drawings that I had to start with, though.

Photo 14

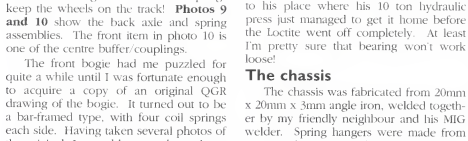


Photo 13

RM55 — the Real *Red Fred*

Story and photos by Dave Harper

The following notes have been gleaned from various documents that I have acquired over the past few years, as well as the articles in the ARHS Queensland bulletin *Sunshine Express*, nos 357, 358, 360 and 362, July - Dec 1967.

38 railmotors with bonneted fronts were built between 1927 and 1931 on AEC model 506 truck chassis with 45hp petrol engines. They were numbered 17-39, 42-45, 50-52, and 54-61 in the QGR post 1929 numbering system.

RM55 entered service on 18 December 1930 and was fitted with a 50hp Gardner diesel engine on 5 May 1939. It was originally open sided but was enclosed in 1935. Tare weight is 6tons 16cwt.

It started life on the Isis branch line, then ran to Fassifern, Townsville and Collinsville at different times. In 1966 it was used on the Ipswich-Rosewood-Grandchester run until written off in October 1966.

The railmotor then remained in storage at the Redbank workshops as it was intended to become part of the then railway museum at Redbank. It was stripped for restoration for the proposed Beenleigh Vintage railway, and the restoration was completed by ARHS members in 1984, and was then christened *Red Fred*. It was used for mainline excursions until 1989.

Red Fred and trailer car PL72 were transported to the Rosewood Railway Museum in July 1990. They are used now for midweek runs for special tour groups; the museum's PB15 no 738 is used on steam running days. See **photo 1**.

The Railmotors in Service

The notes above give the bare facts about *Red Fred*, but give no idea of the impact that these little motors made to travel in regional areas of Queensland. The motors were designed to run on lightly trafficked branch lines, and performed this service admirably for over 30 years. The following is quoted from J. W. Knowles' excellent articles in the *Sunshine*

Photo 1

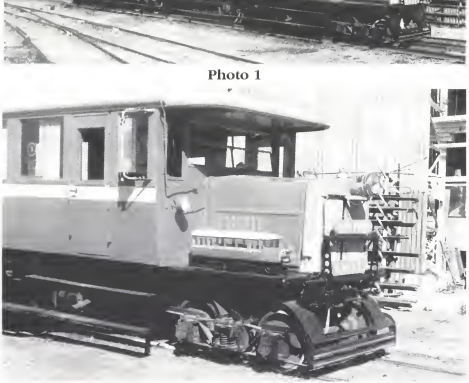
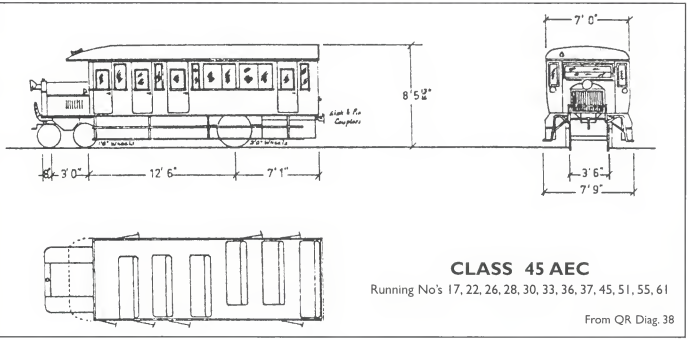


Photo 2



CLASS 45 AEC

Running No's 17, 22, 26, 28, 30, 33, 36, 37, 45, 51, 55, 61

From QR Diag. 38

Express:

'Their introduction revolutionised local services and in 1927 six new railmotor services were introduced, a further 9 in 1928, 9 in 1929, and 15 in 1930. These were provided in the Brisbane, Toowoomba, Maryborough, Rockhampton, Mackay, Townsville, and Cairns Railway Districts, although it was only in the south (to Meandarra) that they penetrated far inland.

The service they provided was generally a daily run from some small locality, such as the terminus of a branch line, to some larger town in the morning, returning in the afternoon. Services were purely local — stops being made at all stations for passengers, mails, small goods and cream. Special Rail Motor Stops were set up at level crossings, opposite farms and on the outskirts of large towns, making the services very like those of a bus. Speeds were not high as the cars were limited to 30mph, and overall averages seldom exceeded 20mph. However, for their day, they were a great boon, replacing slower and less frequent mixed trains and providing reliable service in areas where roads did not exist.

The open nature of the cars was most unwelcome in the southern parts of the state during winter months for cold winds could not be excluded by the blinds. In 1932, therefore, RM22 was rebuilt with full sides and glass windows. The original sides were completely removed and new sides substituted comprising galvanised iron sheeting up to window level, and timber and glass above that.

On the left hand side, doors with winddown windows were provided opposite compartments 1,2,3 and 6, and on the left side opposite nos. 1,5 and 6.

The seats were slightly shortened to provide a 1'3" corridor on the right side of seats 1,2 and 3, and on the left side of seats 4 and 5. The rear seat continued to extend the full width of the body.

The windows, apart from those in the doors, were of the sliding type and inside curtains, sliding on bars were fitted, while pulldown cloth blinds were provided on the door windows. Lest passengers used to the open state of the cars forget the presence of the glass, all windows had white circles marked on them!

A wire mesh protector was provided on the window behind the driver to prevent it being broken during staff exchanging. On each side, a hook and small metal grate on the body were provided for the hanging of water bags.

The new arrangements reduced capacity to 24, but were such an advantage that by 1935 12 others were converted, including no 55. These vehicles operated in the southern part of the state, although after about 1955 RM55 was sent to Townsville, RM28 to Rockhampton and RMs 37 and 61 went to Cairns.

In 1937 a number of Model 4LW 50hp Gardner diesel engines became surplus to the Melbourne and Metropolitan Tramways Board. They were purchased by the Queensland railways and fitted to some of the petrol AEC cars. Those cars fitted with the diesel engines were the ones previously enclosed, and the open motors retained their petrol engines. The diesel units were fitted with starter motors, which, with their batteries, (which were carried in boxes beneath the frames,) increased the weight by about 15cwt. The air compressor was relocated beneath the frame where it was driven from the engine tailshaft.'

Some of the remote branch lines in far north Queensland were operated solely with these railmotors for all or part of their lives. These were the Cooktown, Etheridge and Normanton Railways. The latter operates to this day with a later railmotor known as the *Gulflander*, mostly for the benefit of tourists.

There were numerous modifications carried out on some motors for special purposes, including one which ended up looking like a ute! Various trailers were built as well, to enable these motors to carry freight as well as passengers on their remote runs. Many later varieties were also built in QR Ipswich workshops — all covered in Mr Knowles' articles.

Photo 3

Though small and slow, and largely unsung compared to the more glamorous steam engines, these little railmotors performed a great service at very low cost, and greatly improved communications wherever they operated.

Certainly, from the comments I have received in the few outings with my model of *Red Fred*, they are remembered with affection by those who rode in them. I'm very happy to have built a model of one of these little railmotors, and, who knows, I may end up with a series of them? I can recommend them as an interesting project, far simpler than a steam loco, perhaps the ideal introduction for someone more used to building model boats or aircraft. **Photos 2 - 4** show the two 'Freds' together, the nameplates and the drivers controls repectively, the last two from many photos taken to get the details right on the model.

More details of operations with these railmotors can be found in the following publications by J W Knowles: *Lonely Rails in the Gulf Country*, the story of the Normanton - Croydon Railway, and *The Cooktown Railway*. I believe both are available through ARHS or The Railway Shop at South Brisbane Railway Station.

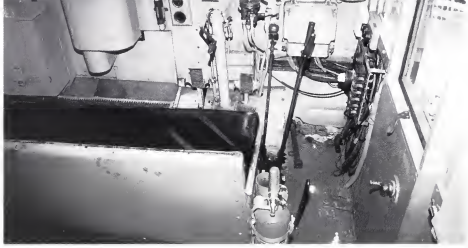


Photo 4

Making Bogies From a Kit

Story and photos by Peter Lukey

A friend recently purchased two sets of Hobby Mechanic's *Budget Bogies* kits but, due to lack of free time and realising milling tackle would be required, the kits were passed on to me to complete. I thought that *AME* readers may be interested in how I went about construction of the bogies so took the opportunity to photograph some of the machining procedures in the workshop and write up a few notes.

The notes are intended for those attempting to build the bogies with limited capacity machinery; in my case a 3½" centre height lathe, 5/16" drill press, and a small vertical milling machine. The milling operations necessary could also be performed in the lathe if a vertical slide is available.

Construction

The axleboxes were tackled first. For these, a piece of 1½" dia continuous cast iron is supplied. As this material will not fit down the headstock spindle of the 3½" lathe, it was cut into four short lengths to allow two axleboxes to be machined 'back to back' in pairs.

The outside diameter was finish machined and the bores drilled undersize before cutting the pairs apart. The bores were then finished using a small boring bar as a 14mm reamer was not available. A light skim brought the axleboxes to length. The face machined at the same setting as the bore was marked as the back face.

The axlebox covers were machined by the same method as the axleboxes and finished on the outside face in a split cup bush (**photos 1 and 2**).

The design calls for 17mm slots to be cut in the axleboxes to allow for the thickness of the bogie frames. However the bogie frame castings varied enough in thickness to need reducing to 17mm, and as a suitable metric end mill was not to hand, 5/8" slots were decided upon. I machined these on the vertical milling machine using the fixed jaw of the vice to locate the slots relative to the back face of the axlebox. I cut a slot in the bottom face rather than machining right across to provide a location for the axlebox keep, which is fitted with only one screw (**photo 3**).

The axlebox cover bolt holes were drilled using a simple jig made out of a steel washer. I drilled these for 6BA as taps and screws of this size were available. Once you have finished tapping the holes for the cover screws in the axleboxes, have a cup or glass of your favourite beverage to calm the nerves after not breaking the small tap in one of the 32 holes just completed! (**photo 4**)

The bogie side frames were tackled next. Due to the variation in thickness of these castings, the areas around the axleboxes and the bolster slot were reduced to just under 5/8" thick to match the axlebox slots. This was measured at the bolster slot using the cast front face as a reference (more about this later).

The sides of the bolster slot, axlebox slots and keep faces were machined using a long series 5/8" dia end mill. The top edge of the bogie frame was used as a reference to machine the slots. 'Freelance' engineering was used to centre the bolster slot which was then used to locate the axlebox slots equally either side. A phone call to assertain the required amount of sloppiness in the axlebox and bolster slots was answered with stony silence until we came to the agreement that some movement between the components was necessary, but the fit had to ensure that all components remain square to each other on assembly. As I do not have 'movement' measuring equipment, this clearance was achieved by providing a 'drop in' fit (**photo 5**).

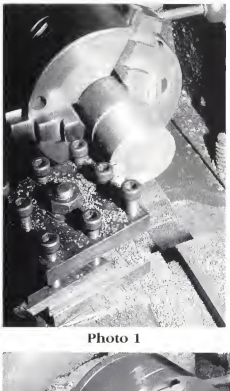


Photo 1

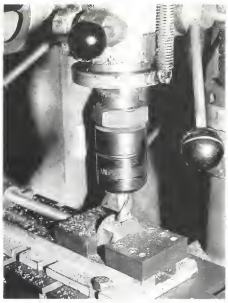


Photo 3

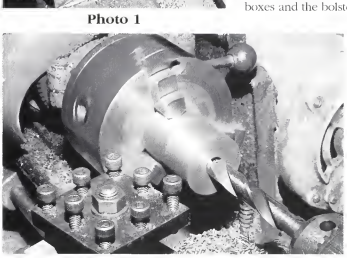


Photo 2

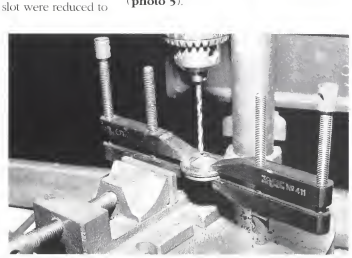


Photo 4

Photo 5

Photo 6

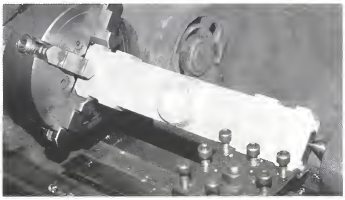


Photo 8

Photo 9

The spring pad faces of the bogie frames were filed square to the machined back face. This meant the removal of up to $^{5}/_{32}$" of alloy on the back side due to misalignment of the top and bottom casting boxes during manufacture. The alloy "pinned" files severely and frequent cleaning of them was necessary. A "dreadnought" cut file would be appropriate for this job. The notches for fitting the bolsters were also cleaned up with a square file.

The axleboxes were marked and fitted to the bogie frames. Some filing was necessary on the front faces of the bogie frames as, although $^{5}/_{8}$" thick at the bolster slot, the bogie frames were slightly bowed and the ends were over the $^{5}/_{8}$" thickness (**photo 6**).

The axlebox keep plates were filed to size and fitted to the frames with $^{5}/_{32}$"W setscrews. The use of Whitworth screws was to take advantage of their relatively coarse pitch which is stronger in the alloy of the frames and less likely to "cross thread". The keep remains square in the bottom slot of the axlebox (**photo 7**).

To obtain alignment of the bogie frames, the ends of the bolsters were marked out and centre drilled. They were then set up between centres and the notches for the bogie frames were machined using a parting tool with top rake. Care was taken to maintain the pivot boss central to the notches as there is very little material to machine away..The 4-jaw chuck in the photo was used only as a "carrier", the headstock centre inside the chuck. This maching method was suggested by Neil McKenzie and worked very well (**photos 8 and 9**).

The positions of the spring recesses were marked out using the machined notches as a reference. I drilled these first with a $^{1}/_{8}$" pilot drill and followed up with a $^{9}/_{16}$" dia pin drill to form the spring seat. The diameter of the springs supplied were $^{9}/_{16}$" dia rather than the 14mm specified (**photo 10**).

The four spring retaining plates were drilled out while clamped together after marking out the top plate. These were drilled $^{9}/_{16}$" dia to suit the springs after

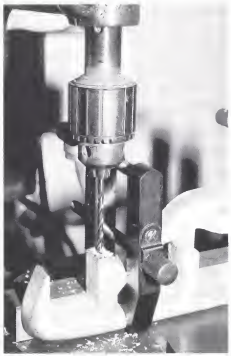


Photo 7

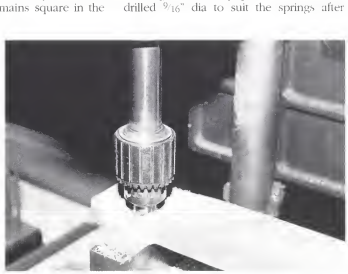


Photo 10

Photo 11

pilot drilling and the centre hole tapped 5/32" W. The bottoms of the bogie frames were then drilled out 5/32" dia and countersunk to accept standard 5/32"W countersunk screws. It proved easier to mark out these items than to try and clamp the components together for marking through.

The centre pivot pin hole was drilled using a simple plug guide (**photo 11**).

The kit includes spoked cast iron wheels. As wheel machining has been described in our magazine several times, I will not repeat the instructions to bore readers. The only suggestion I would make is to rough machine the front faces and tyre first after setting the casting true by the inside of the rim, as often the front and back halves of cast wheels are not concentric and it is the front face that shows. This way if there is any eccentricity between the front and back of the wheel castings, the cast front recess will run true and the back recess can be trued up if desired. The wheels that I used had been machined from steel professionally using CNC methods, to the AALS profile standards

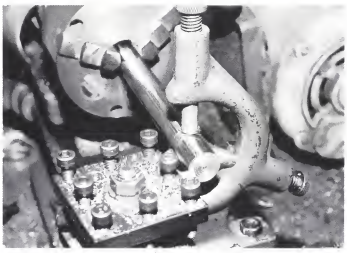


Photo 12

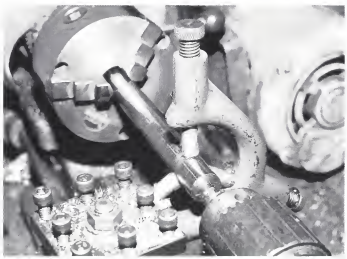


Photo 13

I machined the axles from 3/4" dia steel to suit the bore of the steel wheels. This diameter necessitated centring the ends using the fixed steady in the 3 1/2" lathe prior to machining the bearing surfaces and wheel seats between 3-jaw chuck and tailstock centre. In the majority of cases the cast wheels will be used and the 16mm axle diameter shown in the drawing supplied will be satisfactory. Some builders may be lucky to have the clearance in the headstock mandrel and be able to avoid centring the axles using the steady. The bearing and wheel seats were machined to diameter first and then the shoulders were finished to the correct length. Temporarily assemble the frames and measure the inside distance between the axlebox inner faces to determine the correct length of axle. The axle should have a small amount of side play and not be tight between the axleboxes. The "check gauge" dimension of the wheel seats is the important one to be accurate (**photos 12 and 13**).

Photo 14

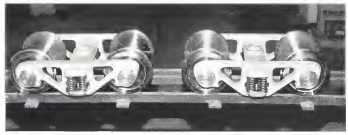


Photo 15

I pressed the wheels onto the axles using a small hydraulic press of the type normally found at the local garage or auto electricans. If this is not available, the wheels could be fixed with Loctite 601 or 680 ® retaining compound. If the surfaces are clean prior to applying the Loctite, the assembled wheels will not move.

Assembly

Assemble the bolster into the side frames and fit the springs. This is a little easier than the same job on the front suspension of the family Holden but be careful of the spring ends as some have burrs where the spring wire has been terminated. Once both side frames are assembled, drop the wheel sets with complete axleboxes into the axlebox slots and fit the keeps.

This completes the manufacture of the *Budget Bogies*. All that has to be done now is to build a wagon to fit them under (**photos 14 and 15**).

Steam Chest

with Dave Harper

Hi there, steam fans and welcome to another collection of steamobilia. To start off this time, it's a great pleasure to offer a photograph of what is supposed to be the very first steam roller sent to Australia. (**Photo 1**)

I'm indebted to Gordon Macmillan of Brisbane who phoned me a while ago to offer this interesting item. Gordon apparently did some work for the Aveling & Barford Brisbane depot in the 1960s and was given the photograph and an accompanying letter then. It clearly pays to let it be known that you're a steam enthusiast!

The photo is date stamped on the back *'Aveling-Barford Australia Pty Ltd, Revesby, NSW. 6 Oct 1967.'* The accompanying letter says, in part: *' A few days ago I came across three photographs, one of which is enclosed. The machine is Aveling & Porter No 806 weighing 5 tons, nominal 6 horsepower, which was despatched to Melbourne on 5th January 1872, the consignee being James McEwan and Co. This was the first Aveling Roller despatched to Australia.'*

The letter goes on to say that the photos probably came from Noyes Bros of Melbourne, before WWII. It appears to be the same design as the Liverpool roller of 1867, but with the water tank over the steering roll .... this machine was the 49th roller built by Aveling & Porter, excluding the 1865 and 1866 prototypes .... it seems that the 47th roller, No 798 may have travelled to Australia on the same ship, as it was despatched to P Welgh (sic) & Co. This latter machine was an 8 nominal HP machine and weighed 20 tons ....'

Unfortunately the letter is unsigned and undated, so we have no idea when and where it originated. However, I think it's worth including the photo for its historic interest, and maybe one of our readers can shed more light on these very early rollers?

Many thanks for your interest, Gordon!

More hammers!

My mail on hammers has dwindled to a relative trickle since last issue's avalanche, but I did receive one delightful letter from Ed Gladkowski, all the way from Houston, Texas, USA. It's good to know that *AME* travels so far afield.

After saying some very complimentary things about *AME* and *Steam Chest*, Ed goes on to say that he's enclosing copies of some pages from an old book called *History of The Manufacture of Iron in all Ages, and Particularly in the United States from Colonial Times to 1891*, by James M Swank and published in Philadelphia in 1892. Don't you love the snappy titles they used back then? I left out the last five lines of the sub-title.

The reason Ed thought we'd be interested is that these pages give details of what was then claimed to be the biggest steam hammer in the world. This monster was built by the Bethlehem Iron Company, and was put to work in June 1891. I've extracted some of the details as follows — a pit 60 ft square was excavated and piles were driven thickly for the anvil foundation and the hammer frames.

It rises to a height of 90ft above the floor — the housings proper are each composed of two parts, the lower ones weighing 71 tons each, the upper ones 48 tons each. These are bolted together and surmounted by an entablature of 61 tons, carrying a 76 inch cylinder 24 feet high. The housings are clamped to base plates, each 10ft by 8ft, and weighing 56 tons, giving a 42 foot longitudinal width of frame and a working floor width inside of housings of 22ft.

A 16 inch piston rod, 40 feet long, operates the enormous tup, which is composed of three parts, two forming the ram and a third the die. The hammer is single acting, steam lifting only, the weight of the falling parts and the stroke governing the work done.

The anvil foundation consists of piles driven to bedrock or gravel, with timber frames, steel slabs and 22 iron blocks carefully machined and fitted, forming a metal mass of 1800 tons arranged in the form of a pyramid.

Using the special valve gears designed at Bethlehem, one man easily controls the motion with one hand.

The hammer is served by four heating furnaces and by four cranes each of 300 tons capacity.

In describing the hammer as 125 tons it is meant that the weight of the tup (including die), piston and rod is 125 tons. This, falling a distance of 16½ ft (full stroke) without top steam, produces the full power of the hammer.

Since commencing operations in 1891 many huge forgings for armour plate and other war and structural material have been shaped under it.

As Ed says, they were giants in those days, who did things on a grand scale without endless talking as we have nowadays! Unfortunately, there were no diagrams in the old book, but the figures alone are quite staggering. Thanks for sharing that with us, Ed.

Massey hammers at Ipswich

Shortly after the last issue came out I received a phone call from old acquain-

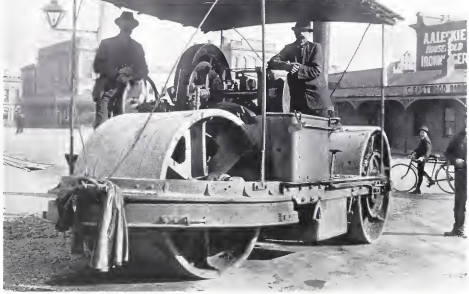


Photo 1

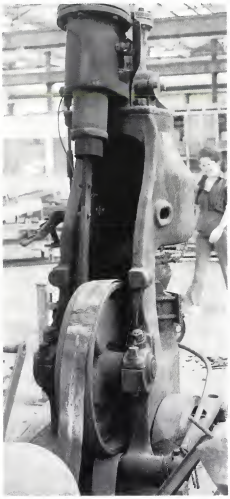


Photo 2

tance Neil Linnehan, who recently retired from his job as steam fitter at Queensland Railways' North Ipswich Railway Workshops. Neil told me that there are a number of pneumatic hammers still in use at North Ipswich, and some of them are Massey types. He was also able to confirm for me that RM14, the old Panhard railmotor that was once displayed at the Redbank Railway Museum, is also in the workshops awaiting restoration.

Photo 4

As I am interested in building a model of the Panhard as a stablemate for *Red Fred*, this gave me more than enough excuse to organise a trip to Ipswich! The Ipswich Tourism Bureau organise trips round the Workshops every Wednesday, so it only took a phone call to book myself in. The whole workshops are being developed as a museum under the ownership of the Queensland Museum, so the tours may well become more frequent as development progresses.

Anyway, I was able to catch a train from my nearest station, which connected with a bus at Ipswich that dropped us outside the workshop gates. (I took a friend from our local U3A group, an ex BR fireman, with me.)

The workshops cover a huge area, and the tour guides, all railwaymen, split the tour group into two parties and led us around, providing a very informative and entertaining commentary. It seems that the old loco traverser has been renovated and will be used as a people mover to save tourists' feet. The tour ended with lunch in the old canteen, for which we were more than ready!

I found that there were numerous Massey hammers scattered about the site; **photo 2** shows a typical example. This rear view clearly shows the belt drive to the air cylinder crank. It also shows a steel bar formed around the front of the hammer. This is a treadle that allows one-man operation of the hammer, possibly a peculiarity of the QR hammers. It certainly looks like a local mod!

There were several larger, air operated hammers used to give us demonstrations of forging, in the blacksmith's shop, but unfortunately the photos were a bit too dark for reproduction.

One interesting shot that did come out OK is **photo 3**. This shows two hammer pistons forged in the blacksmith's shop. The front one is in its raw forged state, the rear one has been machined. Apparently this was a normal job done to maintain these 100 year old hammers. I thought they looked pretty huge till I read about the Bethlehem hammer.

Photo 3

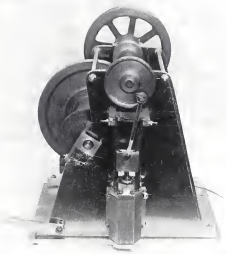


Photo 5

Photo 6

Another picture which just about came out shows the old Panhard sitting forlornly awaiting restoration (**photo 4**). I did get a number of detail photos which will help when I start on the model.

Thanks for the tip-off, Neil, and I can recommend the tour to anyone holidaying (or living) in the area.

Wondering about winches

As I mentioned in the last issue, I've now completed my first model steam winch, based on the friction drive winch that I helped restore at QSVMS a while ago. The next project will be a geared winch, but for this I have to make a couple of basic decisions. I'd like reader's input on the best way to go.

As will be seen in the picture of my model (**photo 5**), I've fabricated the whole model, using aluminium plate for the frames and brass, steel and some cast iron for the rest. Now, the full size winches are invariably built using quite complex castings, see **photos 6 and 7**. Both of these were taken recently at the Qld maritime Museum. **Photo 6** shows a friction drive winch almost identical to the prototype that I based my model on. It's one of two similar winches that have turned up at QMM recently, but their provenance is unknown. If anybody knows them, please let me know.

Photo 7 is a simple little second order winch that used to haul fuel wagons to the Brisbane Gas Works. As you will notice, both these winches have quite complex cast side frames. If we want to model these, do we make patterns, get them cast, and then figure out how to machine them? Or do we fabricate, making modelling much simpler, but compromising the appearance?

This is obviously a personal decision,

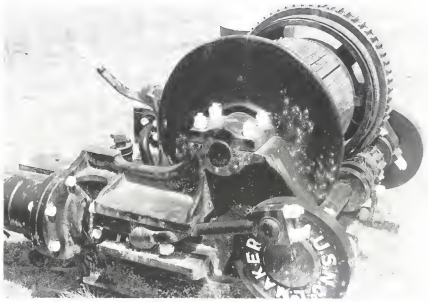


Photo 7

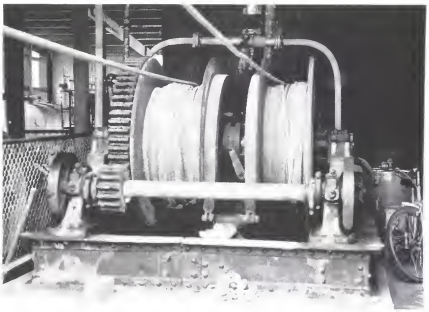


Photo 8

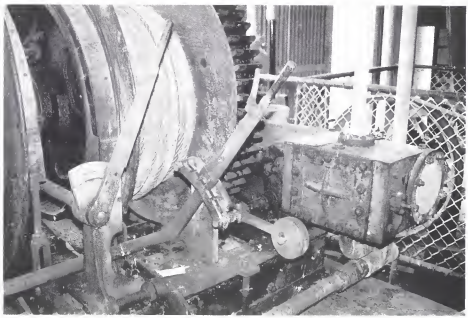
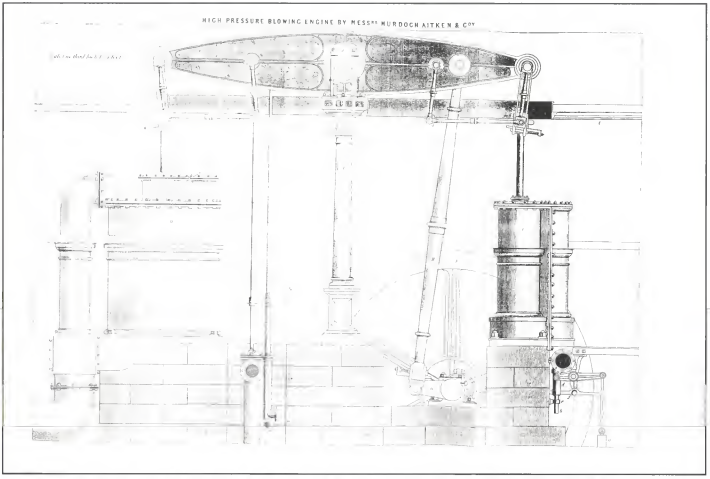


Photo 9



reason I'm putting it to our readers is that we may go to the trouble of making patterns and castings if there is enough interest out there to make it worth while. Obviously, getting a number of castings made spreads the costs, as well as making the patternmaking worthwhile.

John Strachan of Hobby Mechanics has expressed a willingness to go this way, if there is some demonstrated support. John would make casting and material sets available for a winch, in much the same way as he does for QR locos, etc.

For this to happen, I have to produce a proper set of drawings. So, before I commit myself and John to a fair amount of time, trouble and expense, it would be nice to hear any comments from you modellers out there.

Another problem is one of gear wheels for the usual type of winch. To buy these commercially is very expensive, assuming you can get them. For our purpose a rough cast gear which could be finished by hand would no doubt do the job. The full size gears are pretty crude things anyway. Another option is to cut a simple gear using a slotting device and some form of indexing. Brass or aluminium could be used, and an ali one could possibly be used as a pattern for a cast iron one, which would certainly ring more like the full size. Over to you — what do you think?

A working winch in NZ

I have been exchanging emails with Graham McElroy, of Christchurch, New Zealand, on and off for a while past. Graham has given me contacts and details of many steam museums around NZ, and he recently sent me a whole album full of pictures of an actual working steam winch. This winch is in the Wakefield Steam Museum, which I believe is near Nelson on the South Island.

It was Peter Holdaway who put the album together and passed it on via Graham, so I'm very grateful to both gentlemen for their trouble. Apparently Peter actually worked at the sawmill which used this winch in the 1950s, just after leaving school. He has fond memories of hearing the sound of the winch echoing through the forest as it hauled the logs to the top of the hill. From there a Fowler traction engine hauled them down to the mill, which was powered by a second Fowler.

When it was taken out of use in 1956 it was the last commercial steam engine in use, outside the railways, having been in use since 1912. Ross Higgins bought the derelict winch in 1978 and arranged to have it brought down to its present site in the Wakefield Steam Museum.

It has been set up with a spar, and has been used for many years to haul timber using what is believed to be the last steam operated skyline logging system in the world. The winch, built by Tangye, has cylinders of approximately 10" bore x 18" stroke. See **photos 8 and 9**. These clearly show the twin drums which haul alternately on either end of a continuous rope. There is a dog clutch between the drums visible in **photo 8**, which is operated by the lever in the foreground of **photo 9**. The other lever operates the Stephenson's link valve gear, and there are foot operated brakes on each drum.

This seems to be a perfect setup for any modeller wanting to build an authentic working model. If anyone is interested, I'd be happy to loan them the whole album of photos which include some very old b&w shots of the winch in use in the 1950s. On consideration, I'll let you have copies of the pictures as I feel bound to return the album to Peter in due course.

A big blow to finish with

As a final offering for this time around, I'm including one of the drawings from the *Imperial Journal* that I mentioned last issue — the wonderful 1885 volume sent to me by an anonymous admirer in WA. The drawing is of a high pressure blowing engine by Murdoch , Aitken and Co. It has a steam cylinder 36" bore x 8ft stroke, and the blowing cylinder is 90 inches dia! The text gives no clues as to where it was installed, but one of the many blast furnaces then in Britain would have been an obvious location for such an engine. I hope it can be reduced to fit on the page. Until next time, happy steaming!

You can email Dave at: sandave@bytesite.com.au

IBLS and the Traditional Roundup

Canada and the USA, August 2000 — Part 2

Story and photos by Murray Lane

Sunday August 20

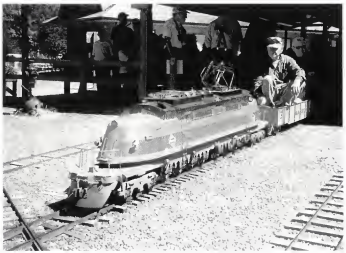
Pacific Northwest Live Steamers

The Kiwis all agreed that the best day yet, was spent at the Pacific Northwest Live Steamers track at the Shady Dell Park near Molalla south of Portland. Once again we felt we were really welcome, and the atmosphere was more like it is in New Zealand. This is one of the oldest live steam tracks in this part of America, and was founded by Harry Harvey in the early 1960's. It was a beautiful day in a partly wooded park, with friendly hosts.

Larry Anderson is a local member, and is seen here with his 4-6-4 New York Central Hudson no. 5405, leaving the covered station area, which has four through tracks. This engine had twin oil burners which were very quite compared with some of the other oil burners. Larry is from Salem, Oregon.

View of the steaming bays later in the day

Looking towards the club roundhouse



Joe Girling's Milwaukee Road Little Joe *XE77 large electric locomotive departing from the station. Two 24 volt 3 HP motors, which can run up to 7000 rpm, allow this engine to pull 100 passengers. The power comes from four large 6 volt batteries, which do not last long with the load of the large motors.*

Dave Giles driving his Shay up the only grade with a large load, every available ride car was commandeered to show our guests what the Shay was capable of pulling

The day was finished off with a very hilarious dinner at *Wanker's Corner* saloon and café. The original *Wanker's Corner* was opened in 1933 and was located 6 miles north of the present location at Wilsonville south Portland. Judging by a lot of the memorabilia, the establishment seems to be run by Australians. The size of the meals has to be seen to be believed. Refer to *Live Steam* magazine June 1982 for further information on this club.

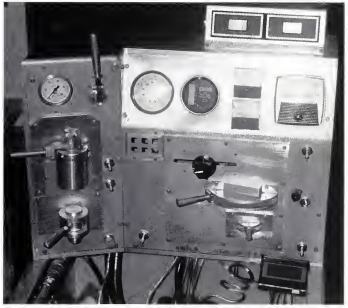
Wednesday August 23

Southern Oregon Live Steamers

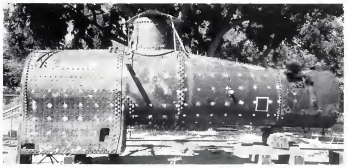
The Rogue River Valley Railroad in Medford Park, Medford City, is the home of the Southern Oregon Live Steamers, which was formed around 18 years ago. The present track, which is in the form of a large diamond, is 2840' long with a further 1800' of sidings. The tunnels and bridges are in place to extend the main line a further 2800', to make a total length of 7840', of laid track.

Floyd Epperson's Union Pacific Big Boy number X4026 was on the steaming bays, having just completed a run on the track before we arrived. This engine was finished 3 years ago after 3 years of work. Not bad for someone in their eighties. Floyd belongs to the host club, and the Big Boy is up for sale at around US$125,000.

A couple of nice looking AT &SF electric's, numbers 945 and 946 were parked in a siding. These were made by Mel Bresee from the Los Angeles Live Steamers. The prototype for these engines was a Baldwin electric made for the South Shore Railway in Chicago.



The control panel replica mounted on the driver's truck to operate Union Pacific diesel power number 3344, made by Holly Synder from the local club



The boiler of the Williamette bush locomotive

Medford Park is also the home of a Willamette bush locomotive. This locomotive was built by Willamette Iron Steel as engine number 18 in 1925 for Owen Oregon Lumber Co. This firm went into receivership in 1932 and was reorganised by its stockholders

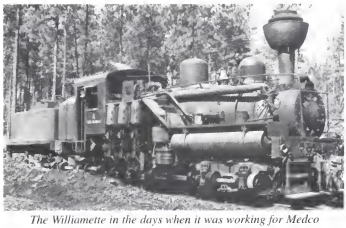
The bogies of the Williamette lined up with many other parts

The cab and two tanks

This is the Williamette's Walschaerts valve gear

The Williamette frames. Note the wooden buffer beam

into the Medford Corporation. The engine remained in service for 34 years until retired in 1959 and put on display in Jackson Park Medford City. After a number of years it began to deteriorate and local fans formed the Southern Oregon Chapter of the National Railway and Historical Society in 1976, and eventually became the custodians. It was moved to Medford Park, formed on the site of the old sewer works, in 1986 and with money pledged towards restoration, work was started. It is eventually hoped to have it running on a recreational part of the old Medco Railroad, out of Butte Falls. Visual inspection at this time shows that most of the components are in very good condition. The Willamette is a similar looking locomotive to the Shay, the main difference is in the engine. The valves on the Willamette are located on the outside of the cylinders and it has Walschaerts valve gear. The valves on the Shay are located on the sides of the cylinders (a bad position if a fault occurs on the center cylinder) and are fitted with Stephenson's valve gear.



The Williamette in the days when it was working for Medco

The Willamette locomotives were made by the Willamette Iron and Steel company, but were introduced too late in the steam era of lumber removal, and only 43 were made.

Refer to the *Live Steam* magazine issue December 1990 for further information.

Thursday August 24

Train Mountain Railroad Museum

Ed St John opened his Over The Hill Live Steamer track in January 1981, on a 60 acre site, and by 1988 it had been extended to 6200'. The track is located half an hour's travel north of Klamath Falls and is built on the side of a small hill in amongst Ponderosa Pine trees. It is at an elevation of over 4000' and the soil is very fine, formed from the ash and pumice from Mt. Mazama, which eventually collapsed into its self around 7,700 years ago, to form a crater lake, the deepest lake in the USA. In summer it can be very cold early in the morning, and very hot by 11 am. Any wind kicks up the light soil. In winter it is often covered by snow, some times for considerable periods.

In 1986 Quentin Breen, a lawyer from San Francisco, started buying property on the east side of Ed's site, and the plan was to build a combined 7¼" railway which was to be the longest in the world at 20 miles. For various reasons, Quentin eventually

Looking over the Crisp steaming bays on arrival, for the larger steam locos

Evening sun shining on the empty marshalling yards

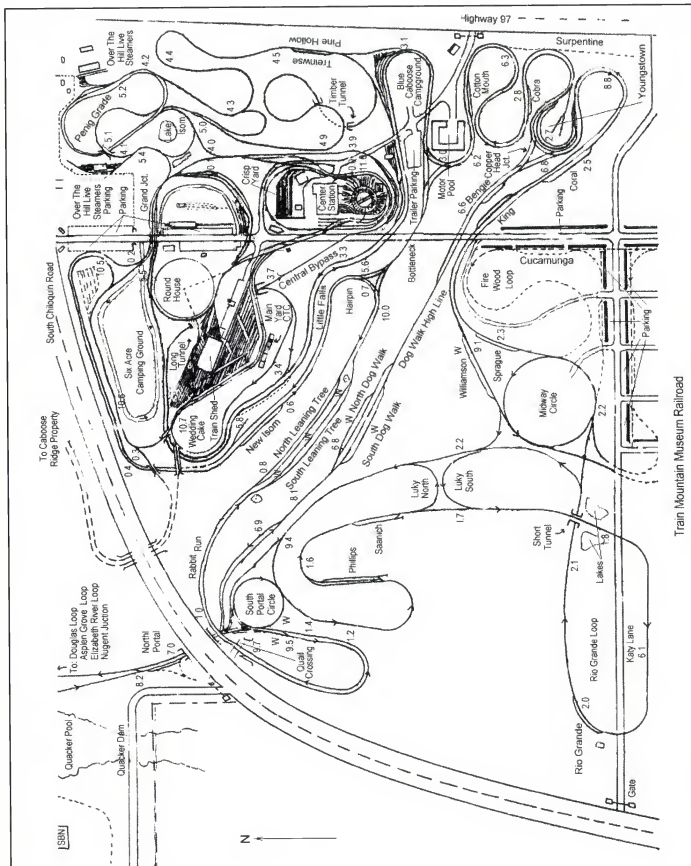
Workshop complex with three raised rolling stock bays on the left

bought Ed out, and the combined site of 2000+ acres, was named Train Mountain. The Over The Hill Live Steamers still operate on the original track but this is now connected to the Train Mountain railway. With the purchase of a number of old cabooses and wagons, the complex became Train Mountain Railroad Museum.

Refer to *Live Steam* issues, January and October 1981 April, January 1986, and October and December 1988, for further information on Over the Hills Live Steamers.

Apart from open meetings like this, the conditions for running on the track require so many days of labour on the complex, before railroaders are allowed to run any trains on the track. There are a certain number of full time workers, but a large amount of the work has been carried out by the volunteers, who continue to carry on with construction and maintenance of the railroad.

The Shay was unloaded and put onto the consigned steaming bay in the Crisp yard, and prepared for an early start the following morning. Although the meet was not due to start officially until Saturday there were a large number of engines already present, although not many were running as it was very hot.



Friday August 25

Arrival at Train Mountain complex at 7 am was greeted by a cold morning, made colder by a breeze. Parking was at the bottom of the hill, some distance away from the main complex, and two 12-seat vans ran a continuous shuttle service between them. A water tanker wetted all the metalled roads throughout the day to stop the dust rising. The topsoil is extremely light, and billows into the air at the slightest disturbance. It sure makes a mess of one's shoes. After breakfast provided on site, the Kiwi contingent all boarded the cars behind the Shay, and eventually moved off with much consulting of the A3 sized track layout sheet. As can be seen from the track layout drawing, the track layout is very

There are line markers every 0.02 to 0.03 miles from the station on the main line. These also have the grade marked on them. + 1.2 = 1.2% rising grade, and a - sign is a falling grade. These are very useful, as it is hard to judge the grades in such a large area.

complicated. The two borrowed flat cars were fitted with padded seats with backs, and were very comfortable to travel on. Before trains are allowed on to the mainline, they are checked that they have a CB radio, for emergencies and fire, a red flag, used to warn following trains that the train ahead is stopped, and finally several bright green wooden blocks.

Some two hours and 10 miles later we had to return to the steaming bays to recharge the propane bottles, which had also been used at Molalla and Medford tracks. The main line is 11 miles in length at this time. Every time a train is derailed the driver drops a bright green block as a marker. If several blocks are found in one spot, the patrolling maintenance crews know that the track requires urgent attention at that point. The patrols are carried out in 4 x 4 or 4 x 6 John Deere 'Gators', which can carry several crew and the necessary equipment.

An auto barrier and lights are used on the crossing of the main

The Shay and Kiwis at the bottom of the hill, showing the typical country that the many tracks wind through.

The station central complex includes a Company store where Train Mountain memorabilia can be bought, and there were three outlets selling food. A view of the model village is set up outside the store.

A well made Allen Models Chloe *built for the Bear Mountain Mining Company crossing the road, prior to moving past the model village*

Model sawmill adjacent to village in the Serpentine.

A very nice A class T-boilered Climax made by Rodney Cogliati from Columbia Falls, Montana.

This nicely made Cli Shay, number 5 Kitty Line, *is owned by Rex Shriver from Idaho, and is propane fired. The green cards seen on some of these photos is the boiler acceptance ticket for the meet.*

Andy Clerici from the Golden Gate Live Steamers, unusual L & M Co. 0-4-2 saddle tank locomotive, Coranada. *This is a model of a 20" gauge engine built by HK Porter & Co. in 1880 for the Longfellow Mining Company in Arizona. (See article on the locomotive in the Sep/Oct 2000 issue of* Live Steam)

road into the complex, and lights only at other crossings.

Fire extinguishers, water for the engines, and Porta-loos are located at intervals around the track.

There are also a number of full size cabooses and wagons scattered around the site. This allows the Train Mountain complex to be classed as a museum.

The turntable is 39' long and has hydraulic turning and jumper ends, which swing down and lock the rails in the correct position. An operator sitting to the side in the middle of the unit controls all the functions remotely.

A line up of 10 two seat Trolleys with Mike Orange and Greg Burrows in the first unit. These are made by Roll Models, who also made the station covers and signal frames, and were available for hire at $10 per hour. Although very well made these trolleys were rather unstable due to the weight of the canopy and uprights. The EMD motor only had a 5 to 1 reduction and with the type of controller used they could run away down hill. Three of these were derailed today due to excessive speed down the hills.

Saturday August 26

It took nearly two hours to get all the locos and trains lined up in the marshalling yards for the official photo shoot. The parade of engines and trains commenced shortly afterwards. Here are a few of the engines seen leaving the assembly area.

Quentin Breen, the man behind Train Mountain, leading off the grand parade, with the official Train Mountain train.

Harry Hass's Durango & Rio Grande number 476 being driven by his son, Harry junior, some where behind all that smoke.

Michael Rayholtz's 2-6-0 Sweet Creek. *A very nicely constructed locomotive, not fully completed, but able to run. Basic engine took only 6 months to build. Roll Models in Fresno California run by Paul Garin, have taken over Keith Watson's business that produces the drawings and Wato castings. They advertise in* Live Steam *magazine.*

Marie Weaver sitting in comfort behind her Galloping Goose

Model village in the centre of one of the horseshoe loops in the Serpentine.

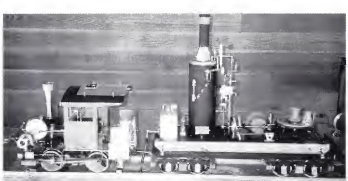
A typical western style barbecue, which all the Kiwis would rather forget, rounded off, the day.

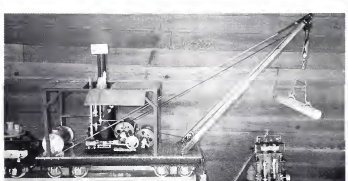
Train Mountain? If you are a true live steamer, then this could be the place for you. Impressive and grandiose? Yes! But if you are not a dedicated driver, this track is not for you. There is nothing new to see when travelling around the track, after a couple of hours. Sure there are lots of tracks, and impressive sidings etc., and several small villages to see while running, with the odd locomotive going the other way, providing there are a 100 or so trains running. In reality there are trees, trees and more trees, with a scruffy grass cover between, and that's it. A half day is enough for the average visitor, and its good to able to say that you have been there.

GWR King George V *built by Keith Wilson and owned by Peter Nott from the Los Angeles Live steamers, coming up the bank on the Serpentine. The sit-on carriages are very good copies of the GWR, and are made by Rob Hall in England.*

Refer to *Live Steam* magazine issues May/Jun 1994 and Mar/Apl 1995 for further photographs and more information on Train Mountain.

To be concluded in the next issue





Above and right: Models to Bill Harris' designs on a table, made by Ted Carter from Montrose Colorado. The loco on the left, Falk No 1 *is described in the* Live Steam *magazine Nov/Dec 1992 to Mar/Apl 1995.*

Garratt Gossip

with John Cummings

On the last weekend in September, my wife and I returning home to the Blue Mountains from Europe via Canberra, called in on our editor and his family. During our conversation about our trip to Germany, the Netherlands, England and Ireland (no, it was not a railways only holiday), our editor mentioned that I had until 1st November to gather my wits together and write up a *Garratt Gossip* for this issue. So, if you think that this is a sloppy GG you know why.

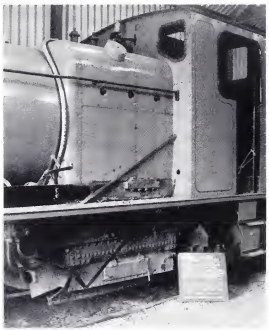
In August, after all our years of corresponding and talking to one another on the phone, Peter Wardle (UK) and I did finally meet up. We had a wonderful, talkative time together. He talked about the time when he worked for Beyer Peacock and I, about my apprenticeship days in the New South Wales Government railways.

We went touring to the Leighton Buzzard Railway, Bressingham Museum, Wells and Walsingham Light Railway (this line is 6.5k long and is the worlds longest 10¼" gauge public railway). The main reason that I wanted to go here was that the motive power on this line is a freelance Garratt loco of 2-6-0+0-6-2 wheel arrangement.

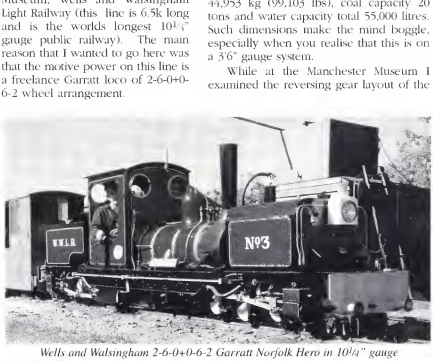
Incidentally, while at the Leighton Buzzard Railway I purchased two books, *Halfway to Heaven* by Terry Martin and *The Origins of the Garratt Locomotive* by Richard L. Hills. Apart from the fact that I have always had an interest in the Darjeeling Himalayan Railway *Halfway to Heaven* has photos and describes the Garratt built for this line and why it failed to live up to the Garratt reputation.

From here we travelled on to see the North Norfolk Railway and the Bure Valley Railway (which is 15" Gauge and 16kms long) and then we went on to Manchester Museum. Whilst in Manchester I bought A.E.Durrant's last book *The Smoke that Thunders*. It's about the Bechuanaland Railway, Mashonaland Railway and Rhodesian Railways. Naturally there are a lot of photos of the various Garratts that operated on these railways. In the final section of this book there is a drawing for a 4-10-2+2-10-4 Garratt which was thought up in the late 70's during the World Oil Crisis. It was designed in metric units — boiler pressure 1800 kPa (256 psi), wheel dia. 1370mm (4'-6"), tractive effort (85%) 44,953 kg (99,103 lbs), coal capacity 20 tons and water capacity total 55,000 litres. Such dimensions make the mind boggle, especially when you realise that this is on a 3'6" gauge system.

While at the Manchester Museum I examined the reversing gear layout of the



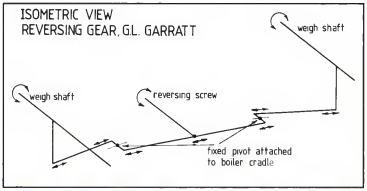
Ex Baddesley Colliery 0-4-0+0-4-0 Beyer Garratt, Bressingham Museum is the only standard gauge Garratt remaining in Britiain. Unfortunately its location made photography very difficult

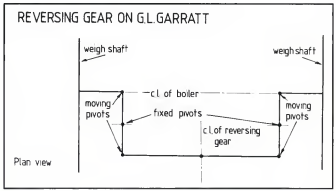


Wells and Walsingham 2-6-0+0-6-2 Garratt Norfolk Hero in 10¼" gauge

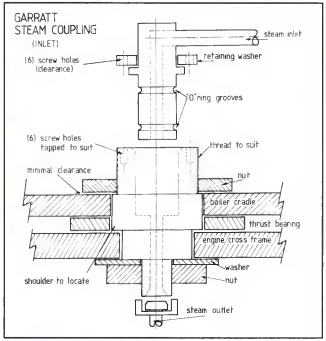
The Baddesley Garratt front engine unit and tank

The Baddesley Garratt rear engine unit and tank





Water stop on the Wells and Walsingham Photo: Peter Wardle

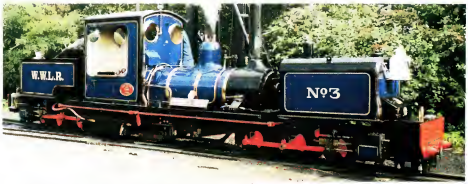


South African Railways Garratt that they have there. The Wells and Walsingham Garratt has the same layout for the reversing gear, so I asked Dave Adams if he could possibly do the drawings as a rush job for this issue (see drawings above).

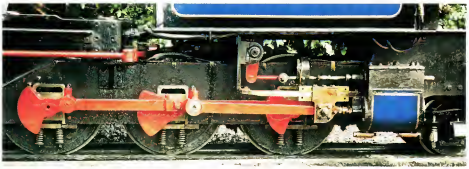
Another thing that I learnt about the Wells Garratt is that it has automatic cylinder drain cocks, which I was informed work very successfully. Peter Wardle also gave me some photos of his *NAROK* where you can clearly see how the reversing gear is located. This Garratt is narrow gauge scale 2½"g and can pull 11 adults.

In May this year while visiting the Western Districts Live Steamers I met Shawki Shlemon who invited me to see his freelance Garratt which is an 0-4-0+0-4-0. I was intrigued with his pivot design so much so that I had Dave Adams draw it up for all of us to see. Should you decide to build this pivot just REMEMBER that the retaining washer should be put on FIRST before silver soldering the steam inlet pipe on.

Recently I was given a *Steam Loco Data* book published by the Public Transport Commission 1974. In this book there is a list of Proposed Locos for NSW and what caught my eye is the listing on three separate occasions for Garratt locos. The first occasion was in 1909 for a 2'6" gauge 0-6-0+0-6-0. Does anyone know anything about this 2'6" line. Did it exist? If so where was it? The two other mentions were, 1920 for a 4-6-2+2-6-4 (TE 34,560 lbs) and 1927 for a 2-6-2+2-6-2 (TE 50,000 lbs). Also in the book *The Origins of the Garratt Locomotive* in the final pages it is stated that in February 1908 plans were drawn up for the NSW Commonwealth Oil Corporation (Wolgan Valley) for a standard gauge 0-6-0+0-6-0 loco. Well, that is all for now. Hopefully in the next 6 months I will hear from our readers with news about other Garratt builders.



The above view of the Wells and Walsingham 10¼" gauge Garratt and the close up of the front engine unit (below) were taken by Peter Wardle



A Remarkable Achievement

Diamond Valley Railway Carries its 2,000,000th Passenger

By Robert Carlisle

All photos by the author unless otherwise indicated

Diamond Valley Railway, one of Australia's most successful miniature railways, began at Chelsworth Park, in the Wilson Reserve, Ivanhoe, on the banks of the Yarra River in the late 1950's. It was the dream of the late Clem Meadmore to create a 7¼" gauge miniature railway for the people of Melbourne.

However, due to constant flooding by the Yarra River, the railway was forced to close and its equipment was relocated to Eltham Lower Park during 1960. Clem Meadmore, who was then an ill man, relinquished his interest in the railway and the founding team of workers formed a new club called the Diamond Valley Railway. The new railway commenced passenger operation on the 29 October 1961 over a short circle of track laid through the trees of what was a rather harsh bush setting.

Over the last 39 years the railway has gone from strength to strength and has developed to what is now arguably Australia's premiere 7¼" gauge miniature railway. The funds to build, maintain and develop the railway have primarily come from passenger fares and some government and local government funding. The real driving force in its development has however come from the volunteer membership who have supported the aims and aspirations of the Club over the years. Today membership stands at about 140 members and the club is administered by a 10 person Committee of Management which includes specified positions for Signals, Way and Works, Rolling Stock, Station Master and Public Relations. On any operational day between 20 and 30 members may be assisting at the railway.

The railway currently has a figure eight main line of some 2km through the bushland setting of Eltham Lower Park plus another 1.6km of sidings and crossing loops. All track is laid in 14 lb flat bottomed rail (some sections are Krupp rail rolled in Germany up to 100 years ago) on hardwood sleepers at 300mm centres. All main line and passing loops are ballasted with 16mm screenings and laid to a minimum radius of 60 feet with several works sidings reduced to 40-45 feet radius. The grades are generally 1 in 60 to 1 in 80 with several sections as steep as 1 in 40 or 2.5%.

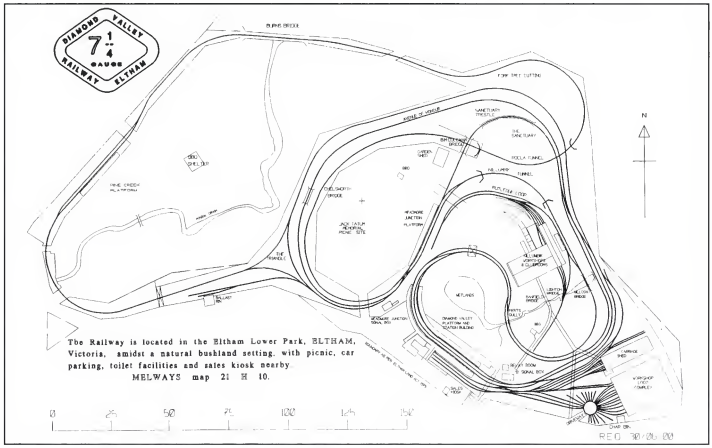
Above and below: The turntable on Sunday morning with 18 engines on shed

The rail system currently incorporates some 83 sets of points either operated by electric motors, water hydraulic power or lever operated in sidings.

The railway owns 8 steam, diesel electric and diesel hydraulic locomotives plus some 50 passenger and freight carriages. In addition, the railway has agreements with a number of members to operate approximately 30 private locomotives and 45 goods vehicles and passenger carriages for running the railway and supplementing the passenger service every weekend through the year. The railway currently carries about 70,000 customers a year and to do this, it schedules about 50 to 70 trains each Sunday around the Pinetree Loop and the Inner Circle lines. Trains are generally 5 to 6 car sets but may range from 2 to 3 car consists of private members' stock to 8 to 10 cars with multiple diesel locomotive combinations to accommodate special events. To ensure that passengers are fully protected whilst travelling on the Railway all passenger rolling stock is built with sides. Because lineside structures include platforms and numerous point motor boxes, open sided straddle cars are not allowed on the railway.

To manage and operate this large fleet

The Bunyips wait at platform 2 while Graeme Daniel brings Elfride *by on the through road*



of rolling stock the railway infrastructure includes two signal boxes ('A' box at Meadmore Junction and 'B' Box at Diamond Valley Station), the W G Pert Workshop and adjoining carriage shed complexes which service and house the fleet, five bridges, two tunnels and three stations at Diamond Valley, (which has two main line platforms and a dock road for dispatching passenger trains), Meadmore Junction, (which services the Jack Tatum Memorial Picnic Grounds) and Pine Tree Loop (serving the public picnic grounds adjacent to the car park at Main Road which passes the western boundary of Lower Eltham Park). The railway also has a concrete 2-story club house providing a members' lounge, kitchen and office on the first floor, and washrooms, showers and toilets and storage, and a workshop area on the ground floor. Incorporated in the building is a secure split-level 5-road carriage storage facility. The building also has a verandah around three sides which provides a marvelous outlook.

A feature of the railway is the 27-road 18-foot hydraulic turntable. It serves as an unloading point for vehicles bringing locomotives and rolling stock to the railway and can be raised to the tray height of a truck to facilitate unloading. The unit also serves the arrival and departure roads, access to the Bill Pert locomotive repair and storage workshops complex, a multitude of steaming up bays and the raised ashpit road. All other turntable roads are at ground level and a number are fitted with water and air line connections for lighting up steam engines.

Safe-working control of the railway is by way of a huge array of approximately 50 upper and lower quadrant, color light signals and shunting discs patterned after full size Victorian Railways practice. Most signals are mounted on removable posts on spigots, which fit into concrete sockets in the ground and stored on a special signal train. One signal gantry is currently in use where the signals are permanently fixed, up out of the vandals' attention and it is intended to erect additional gantries at track junctions and other locations where clearances are restricted. Consequently, when operating at night, the railway is renowned for a kaleidoscope of color and together with the sounds of the engines working hard up the front of the train on the heavy grades, it is an experience not to be forgotten.

To ensure a world best practice standard is maintained during operation, all passengers are carried in 2 inch scale outline carriages fitted with scale cast steel automatic couplers, safety chains and stored air and train line fittings and operate from raised platforms to ensure that passengers can board and alight safely. Trains operate pursuant to approved safety codes including operational guidelines adopted by the Australian Association of Live Steamers. As part of its risk management policies DVR requires all station staff, drivers, guards and signalers to be trained in safe operational practices.

Earlier this year the railway set up a special 2 millionth customer sub-committee chaired by foundation member Alan Calder, to oversee the celebrations on the day on which this notable event was finally celebrated, which happened to be 8 October 2000. To ensure that train running on the day would go smoothly, the Committee also appointed Mark Banfield, (a "spark" driver on the "big railway") to act as operations officer. It wasn't long before he was called the "Fat Controller" (which he wasn't, although with a fear-

The Bunyips climb away from Three Arch Bridge with the special test train

some black top hat and a pillow squashed down his overalls he certainly looked the part!). Mark was El Supremo for the day and did a great job making sure train running, marshalling of trains, relief of crews and all the little things that need to be attended to were dealt with firmly but with a smile.

As the day approached and the customer numbers ticked over, excitement grew. A major concern was the weather but fortune smiled when a cold front blew over the previous day and Sunday dawned clear and fresh.

The first train out of platform two at 11:00am was foundation member, Ron May driving his VR outline K class 2-8-0 *Oakstream*, hauling two 12-wheel 'E' cars. Ted Calnan and Len Cottrell then departed with two 'Bunyip' 0-6-2Ts on a special test train of 9 empty cars to get some practice on handling the load and they were followed by Geoff MacPherson on his 2-8-2 D&RGW K37 steam engine with three cars and a caboose followed by a cane train set of 6 cars and a van behind *Pauline*, the club's 2-4-0 Willis-built steamer. Next came Richard Hayes' Heidi Type 0-4-2 *Elfride* hauling 2 cars, driven by Graeme Daniel, a senior driver, examiner and safe working instructor at Puffing Billy. Richard built

Ron May enjoys himself hauling an empty train across Sanctuary Trestle

the engine, the oldest running on the day, under the guidance of Bill Pert in 1977, and it has been in continuous service ever since. By lunch Jim Wilcox's VR 'DERM' (Diesel Electric Rail Motor) and 'E' class electric combo was circulating with 4 red 'W' cars and John Browns Milwaukee SD45 was seen hauling a long 5 car train of 9 and 12 foot gondola cars.

The private owners were well represented by Michael Murdoch driving South Australian Railways Alco No. 700 built by his father John, banking VR X44 DE driven by owner Andrew Mierisch. This train comprised a blue container car owned by Len Cottrell, 6 club BG freight cars and two large gondolas owned by John Brown. The 9 cars and two engines were about 125 feet long.

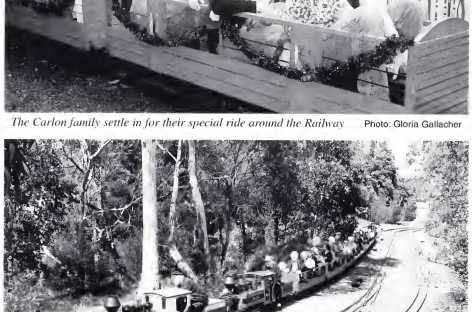
About 1:25pm, Treasurer Jan Cottrell sold the 2 millionth ticket. The lucky customer was Tom Carlon of Heidelberg who had come to the railway to ride with his wife, children and grand parents. The celebrations immediately swung into gear to mark the event. Bob Carlisle, MC for the day, announced a short cessation of train running and a planned series of speeches by the MLA for Eltham, Wayne Phillips, the Mayor of Nillumbik, Cr. Margaret Jennings, and our President, Phillip Hibbs. Wayne Phillips gave a great speech supporting the aims and objectives of the railway and how it provided an important community facility for the people of Melbourne. Alan Calder then handed a presentation case enclosing a model of a diesel locomotive painted in DVR colors to Tom Carlon after which he and his family and all the dignitaries and invited guests were then invited to board the special train hauled by the two 'Bunyips'. This was followed by afternoon tea in the club rooms.

The Carlon family settle in for their special ride around the Railway Photo: Gloria Gallacher

It was a train worthy of the occasion. The lead Bunyip was *Joyce*, the Club's engine, in a striking yellow and brown color scheme driven by Ted Calnan, followed by *Tom Thumb*, the second 'Bunyip' in a blue livery, proudly driven by member Len Cottrell and the guard was life member Paddy Murphy. The train comprised 9 NBH type cars (originally built by Ron May) decorated with copious bunting and balloons.

Upon the departure of the special train from platform one at Diamond Valley, regular train running recommenced out of platform two to cater for the large crowd that had assembled to watch the special event. Wonder how long will it be before we notch up our 3 millionth customer!

The next big challenge will be a weekend to remember in October/November 2001 to celebrate our 40th Birthday. A planning committee will shortly swing into action to organise what we hope will be the largest and most comprehensive gathering of 7¼" gauge enthusiasts that Australia has ever seen!



1:45 pm and Ted Calnan eases the heavy special train down the grade towards Rocla

Australian Miniature Traction Engine Rally

Inverell, NSW — October 2000

Text by John Oliver, photos by Phyl Oliver

Part of the line up for the Grand Parade

Some of the activity as engines are readied for a busy day

John Oliver from Canberra hauls an extra water tanker behind his riding wagon

Not the Grand Parade but an interesting line up of models, nevertheless, including a Stanley Steamer in the background

This years traction engine rally was again held at Inverell N.S.W. and with an attendance of some 14 traction engines of all scales, some fine radio controlled steam boat models and a half scale Stanley steamer car. All those attending voted it one of the best rallies yet thanks to the great organising by Mr and Mrs Gordon Blake and their band of helpers.

At the Sunday morning meeting of participants, discussion was held as to where the next rally would be staged with several venues being put forward .

The meeting decided on the following sites for the coming five years:

- October 2001 — Mannum S.A.
- October 2002 — Canberra A.C.T
- October 2003 — Timbertown Port Macquarie N.S.W.
- October 2004 — Lake Macquarie Live Steamers
- October 2005 — Inverell

Now you have plenty of time to start planning your holidays!

Another shot of John Oliver, this time trying to show a bit of class. Never mind, you'll get there one day, John!

Rally Organiser Gordon Blake managed to find time to drive his 4½" scale Burrell, which is also featured on the cover of this issue

A wagon-load of happy faces enjoy a ride behind Peter Smith's Ransomes

Another shot of Peter with his recently completed Ransomes road locomotive

Bert Bruce leads a procession of engines around the lake on his Cliff & Bunting

Engine Alternator for Model Locos — Notes

By Stan Allison

This article is for guidance on adapting various equipment for model loco use but which equipment were not designed to work together.

The proposition is a 3 horse power (HP) governed engine driving a voltage regulated auto alternator rated at 80 amps at 14.5 volts nominal output, to be connected across a 12 volt lead acid battery to *share* the battery load of an electric loco having 12 volt traction motor(s). To achieve this we will use certain given information on the engine and alternator together with information we can derive and other information we can only guess at, i.e. guesstimate.

Engine output is given in horsepower (HP) and occasionally in watts (W). W = HP x 746; watts is a convenient power unit for both electrical *and* mechanical power. The engine rating is a *true* figure of the continuous power that can be delivered at the engine shaft at the rated revs per minute. (RPM). We don't need to know the engine efficiency although fuel usage figures are given sometimes.

Next, maker's test figures for an alternator are related to auto service where the alternator operates over a wide range of RPM and output amps. For example figures for an 80 amp alternator tested whilst mounted on its auto engine could be 10 amps at 1,000 alternator RPM, 30 amps at 1,600 RPM and 80 amps at 5,800 RPM all within the range of 14.2 - 14.6 volts.

Tests at the upper current loading are brief as continuous loading at 80 amps could lead to overheating. A conservative output of say 30+ amps with bursts up to 40+ amps would be more realistic for continuous running.

The efficiency of an auto alternator is never given but is quite low. I have been some months (on and off) preparing this article using an efficiency figure of 40% but this has been a guess. Jim Gray's paragraph on page 36 of AME issue. 90 gives a figure of 30% from his experience and this figure will be used in our calculations. If efficiency is taken at too low a figure the finished unit will simply perform better than expected.

A 3HP engine should deliver 3 x 746 = 2230W but let us de-rate the engine to 2.3 HP which gives 2.3 x 746 = 1710W. This 1710W mechanical drives the alternator which at 30% efficiency should deliver 1710 x $^{30}/_{100}$ = 510W electrical output. At 14.5 volts (E) the alternator output (I) would be

I = $^{W}/_{E}$ = $^{510}/_{14.5}$ = 35 amps continuous.

At a burst the engine could deliver 2230 shaft watts when the alternator could be raised to 2230 x $^{30}/_{100}$ = 669 watts output. At a regulated 14.5 volts the alternator could then deliver $^{669}/_{14.5}$ = 46 amps.

To allow for the power loss in the engine to alternator belt drive we will reduce the alternator output figures to 30+ amps continuous and 40+ amps at a burst. The alternator heat and windage losses are allowed for in guesstimating the alternator efficiency at 30%, i.e. 70% loss.

The graph (**figure 1**) has been derived from the typical test figures given above with RPM on the 'x' axis and output amps on the 'y' axis.

The point of interest on the curve shows an output of 45 amps that can be expected at an alternator RPM of 2,300. The 45 amps output can be expected for extended bursts but not continuous loading.

The alternator 2,300 RPM is a minimum figure under load so in deciding the engine to alternator drive ratio the alternator RPM should be lifted to say 2,800. If the engine HP is rated at a RPM of 3,200 the engine to alternator drive ratio becomes 3,200 to 2,800 or one to one — near enough.

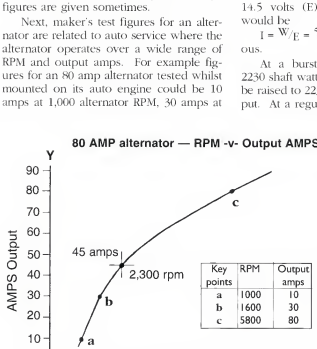
If ultimately the engine labours when the alternator is trying to deliver 40+ amps, the engine to alternator drive ratio could be lowered to say 3,200 - 2,500 or a ratio of 1.3 to 1 or say a 4" engine pulley to 5" alternator pulley. Also there is a RPM flexibility in adjusting the engine governor under load.

A fully charged battery at say 12.4 volts could drop to about 11.4 volts under a 20 amp load whilst our "80 amp" alternator under a 40 amp load could hold 14.4 volts giving a joint load output of 60 amps but with a difference of about three (3) volts.

Now the battery and alternator outputs must be connected together at the same *loaded* voltage (i.e. 11.4 volts) at the 60 amp *shared* load. This is achieved by connecting a suitable ballast or dropping resistor into the alternator output circuit as in **figure 2**.

Ballast resistor R = $^{E}/_{I}$ = $^{3}/_{40}$ = 0.075 ohm. This resistor will give out a heat or power loss of W = I^2R = 40^2 x 0.075 = 120 watts at the burst *alternator* load of 40 amps and similarly losses of 92 and 67.5 watts at lower *alternator* loads of 35 and 30 amps — see column * on the Loco Loading Chart on the next page.

Typically the alternator is regulated from two connections to the automatic voltage regulator via a polarised plug with connections shown as **S** and **L**. S and L are connected by a switch to the regulated voltage point (RVP) at the ballast resistor. The 300 ohm resistor and the panel lamp start the alternator excitation at switch-on and after switch-on show if the alternator fails (standard auto practice).



Key points	RPM	Output amps
a	1000	10
b	1600	30
c	5800	80

Figure 1

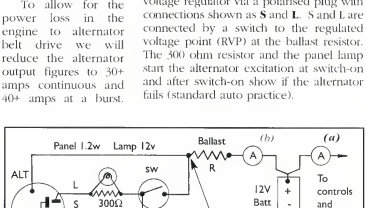


Figure 2

Two ammeters are needed — one (**a**) to show the total loco motor load and (**b**) to show the share of the load taken up by the alternator. The alternator power leads should terminate at the battery.

The value of resistor **R**, 0.075 ohms, is not easy to measure as it includes the resistance, however small, of the ammeter (b) and the circuit to battery **+ve** plus the return circuit from battery **-ve** to the alternator frame. Adjustment of the value of R is best made under loco working conditions.

Performance figures calculated for the interaction of the alternator and battery at various loco loads are as follows:-

Total loco load ammeter (a)	Alternator load * ammeter (b)	% of total load	Battery load ammeters (a) - (b)
60	40	65	20
45	35	75	10
30	30	100	0
0 (loco stopped)	5		5 (on charge)

Loco Loading Chart

These figures have been rounded to the nearest 5 amps but are accurate enough to show the loading pattern i.e. the battery accepts about ⅙ of the total load at a burst down to practically zero at light loco load (30 amps). Below light loading battery voltage should rise until it accepts a charge at about 13.5+ volts.

Start testing by *listing your own actual loading figures using the battery alone*, i.e. light loading, normal loading for flat running and burst loading for accelerating or climbing.

Then with the alternator running adjust the resistance value of R to result in substantially the same *percentages of loadings* supplied by the alternator as shown on the chart but using *your own* loco loading figures. Do not rush this stage. Tests and adjustments may spread over several days and trimming the value of R may be needed after further days of running.

Reduce the value of R to achieve a *bigger percentage* of the total load being accepted by the alternator.

Adding an engine/alternator to *share* the load of an existing battery driven loco should extend the daily running between three and four times allowing that the battery is fully charged at the start of running.

Peak loading *above* the figures listing on the Loading Chart will be taken up mainly by the battery.

By using a larger engine the alternator will deliver its maximum output at a peak of 80 amps at 14+ volts. The circuit shown in Figure 2 is used but with the resistor R and ammeter (b) deleted and with the Regulated Voltage Point (RVP) connected at the point where the motor(s) is/are controlled.

At the 14+ volts the battery will not contribute to the loco loading but is still needed as a voltage reference point for the voltage regulator and to excite the alternator at start up; but a smaller battery can be used to compare with the *shared load* arrangement with the 3 HP engine.

At 80 amps output at 14.5 nominal volts (the voltage will be closer to 14.2 volts) the output could be W = EI = 80 x 14.5 = 1160 watts.

The mechanical input at the alternator shaft allowing an efficiency of 80% = 1160 x $^{100}/_{80}$ = 8870 watts.

Alternator shaft input = $^{W}/_{746}$ = $^{8870}/_{746}$ = 5.2 HP.

Allowing an engine loss of power over its life, say to 80%, and 1.5 HP loss in the belt drive, the engine *rated or true* power needs to be 5.2 x $^{100}/_{80}$ = 6.5 + 1.5 = 8 HP.

Referring to our chart (Figure 1), the alternator needs to rotate at 5,800 RPM minimum to achieve 80 amps output but to allow for a possible drop in engine RPM under this peak load the pulley ratio should give an alternator RPM about 6,500. Again as mentioned earlier, if the engine should labour under peak loading alter the drive ratio to give a slightly lower alternator RPM

The alternator must rotate in its normal direction — usually clockwise at the shaft end — so the fan will achieve maximum cooling.

The distinct advantage of the larger engine is operating at the higher 14 volts — a noticeable improvement in loco performance compared with 12 volt working.

Shop Hints of Peter Dawes

Dealing With Swarf — a Drill Press Chip Catcher

A between-jobs project that takes about half a day if you are only making the simpler version, is intended for those MEs who have a floor model drill press. It's not suitable for machines where the rack extends all the way to the base — for reasons that will become apparent.

I made an arm supported by the column, which in its simplest form, carries a particle board shelf. The shelf supports a large rectangular plastic bin of the type obtainable from supermarket or discount shops. My bin measures about 18" x 12" (450 x 300mm) at the top and is about 6" (200mm) deep. It sits under the table to collect the drilling swarf. When the bin fills up it is lifted off and emptied into into a supermarket bag for disposal.

Constructing the arm

The part of the arm that clamps around the column is made from a piece of 75 x 3mm black steel tubing about 5" long. My drill press column is 72mm diameter so the ID of the tube is a couple of millimetres too small. That can be fixed!

The ends of the tube are trued in the lathe and the outside corners bevelled.

Four pieces of ¾ x ⅜" (20x5mm) flat bar stock are cut the same length as the tube to make lugs. With the lugs clamped together in pairs, two ⅜" diameter pilot holes are drilled, centred on the width, one at each end. Separate the lugs and open out the holes in ONE of the pair ⅝" and in the OTHER ¾". Tap the latter ⅝"x7W (or use metric sizes if preferred. It so happens that I still have a much better supply of Imperial taps and dies and bolts than I have metric sizes).

Four ⅝" x 1"W hex bolts or equivalent metric are required. But to save spattering the good bolts while welding the lugs onto the tube, use some old rough bolts to clamp them together temporarily. Clamp the pair of lugs with spacer onto the tube. Weld them to the tube along each side. Repeat for the second pair placed on the diametrically opposite side of the tube.

Remove the screws and spacers and split the tube between each pair of lugs with the band saw, or the angle grinder cut- off wheel, or with the hacksaw. Bevel the corners of the lugs for appearance.

Now the tricky part of the job is to open out the two halves slightly so they fit the column accurately. If you have an oxy torch and a piece of scrap bar of the same diameter as the column you might prefer to shape it by heating and forming it over the mandrel. However I found a 2" pipe union to be almost exactly the right diameter and I used that as a former to just hammer the tube to shape. A few good belts with a short-handled 4lb mallet did the trick. In the end the fit was nearly perfect. If the diameter is right but you cannot get a good fit because of some small unevenness then it is best to bolt the two halves together with suitable thickness spacers and skim out the bore in the lathe. It is important that the tube fits properly on the column or the arm will wobble no matter how tight the bolts.

Now if your piece of tube is too large rather than too small, then it's necessary to

cut a strip out of the circumference. For every $\frac{1}{16}$" it is too big in diameter, cut $\frac{3}{16}$" out of the circumference, plus an extra $\frac{3}{8}$" (remembering that circumference = π times diameter). The extra bit is to provide some residual clearance. Reduce the diameter either by squeezing it in a big vise or belting it in with the hammer.

The arm proper is a piece of 2" x 1" RHS (50 x 25 x 2mm) about 8" long. The shorter sides at one end are filed concave to approximately fit the outside of the tube, and then the piece is welded to the tube, making sure it is aligned with the bore. If the heads of the bolts are to be at the BACK then weld the arm to the piece that is TAPPED, otherwise weld it to the piece with the $\frac{3}{8}$" clearance holes.

Space the arm a fraction of a millimetre from the tube and tackweld the TOP edge. Check the angle. It should be a few degrees canting upwards at the front and if OK, tack the bottom edge because the weld will tend to pull it towards square again. If not right, hammer it carefully until it is approximately correct. A slight residual upward tilt is desirable because it will stop things sliding off the front of the table with vibration. That applies especially to the cabinet-with-drawer option to be described below.

If the piece of tube is already a good fit round the drill press column, you can tack the centre of the two sides of the RHS for about $\frac{3}{4}$". If it is on the small side, weld along the full length because the weld will open it out slightly. Experienced welders will not need me to tell them how to juggle this. If inexperienced ones remember to allow for the fact that a weld always contracts when it cools, they should be able to get it right. You can avoid the contraction by firm clamping but this job is not an easy one to clamp.

2mm steel is tricky to weld on account of blowholes so weld in short runs with reduced current. To the outer end (which will be at the "front") is welded a cross arm slightly shorter than the length of the base of the bin. Just make sure it is square to the bore of the tube and that the two pieces are flush on their top face.

This cross arm can be the same or lighter RHS, but I used a piece of 1 x 1" (25 x 25) angle because I happened to have it. Drill the two $\frac{1}{4}$" holes in its ends for attaching the table before welding it because it is easier to do it at this stage. Again use short welding runs to avoid blowholes. The support arm is now in the form of a TEE. Drill a $\frac{1}{4}$" hole vertically through the RHS arm back near the column for a bolt to fasten the back of the table to the arm.

The wooden table is $\frac{3}{4}$" (20mm) particle board about the same dimensions as the bottom of the bin. Bolt it to the cross arm with three cup head (coach) bolts, recessing the heads slightly with a suitable wood bit. If the cross arm is of angle iron then 1" bolts will suffice otherwise with "2 x 1" RHS, use 3" bolts.

The steelwork can be finished by coating with Fertopro or Ironize ® or similar and then spray-painting it to match the drill press. The discount stores, such as *Price Busters*, sell very convenient spray cans of quick-drying enamel for $2. The wood of course should be primed, sanded and undercoated.

Positioning the arm

The arm should be mounted as high as possible on the column to catch the maximum quantity of chips. Unfortunately some will always fly off. The best position is just under the ring that supports the bottom end of the rack. In the event that the rack extends most of the way down to the bottom of your drill press, you have a problem. I haven't got an answer for that but I expect that the support would have to come up vertically all the way from the base itself and then it becomes much more difficult to attach and remove. I doubt if it is worth it in this case.

If a drilling job requires extra depth then it is a simple matter to lift the bin off temporarily. If still more clearance is required, loosening the bolts on the clamp allows the whole arm to swing around out of the way.

This bin has had a dramatic effect in reducing the amount of swarf on my floor.

A small parts cabinet option

A variation on the same theme is to add a cabinet-plus-drawer to the shelf under the bin. This will make it much more than a half-day job — more like two days plus painting time, but so be it. Multidrawer cabinets are available in supermarkets but tend to be made of rather light plastic and too small, so a custom built steel or wooden one is a better proposition. The drawer can be used to hold fasteners, taps, drills, chuck key, countersinks, etc.

My cabinet/drawer unit is made out of $\frac{9}{16}$" particle board scrap from some old kitchen cabinets. It was already faced with a thin layer of white plastic on one side. The cabinet ended up 16" x 11$\frac{1}{4}$" x 7$\frac{3}{4}$" high in inside dimensions. To make it I cut a top and three side pieces — a left and a right side and a back. The $\frac{3}{4}$" thick table became its base. I routed $\frac{1}{8}$" deep grooves the exact thickness of the board along appropriate edges and just glued it together with PVA glue without screws or nails. It's very strong and quite rigid. I can stand on it. I don't recommend making it without well-fitting routed grooves.

The drawer itself is made similarly but is smaller in height by about $\frac{1}{4}$" to allow for some Laminex, Formica ®, or similar, runners. These take all the wear and tear of the sliding action. They consist of $\frac{3}{4}$" wide strips of Laminex® glued with contact cement along each side on the bottom of the drawer. Similar strips are glued to

the inside of the cabinet in line with those on the drawer. A similar pair on the top of the sides of the drawer will limit tilting when the drawer is pulled out, and is a definite improvement. Keep paint away from the contact cement.

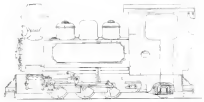
Unlike the cabinet which is only subject to compression loads, the drawer front can be subject to considerable tension loading so it should be screwed to the sides and to the base with long particle board screws, as well as being glued.

Remember that the drawer doesn't require a top but it has four sides. It's harder than it looks to get all the joints correct and close fitting so it should be worked out on paper before cutting out the parts or you'll end up having to remake some of them, like me!

The drawer handle can be jig-sawed out of a piece of hardwood, or more conveniently, a plastic or metal one bought cheaply at the discount store.

An occasional spray of silicone lubricant will keep the slides running smoothly. A really professional drawer would use a pair of ball bearing runners. These prevent over-extension, and overbalancing, and give a detent action at full extension, but that takes us well beyond the intended scope of this article. One caution however: if proposing to use ball bearing runners buy them BEFORE making the drawer because side clearance becomes critical and must be held to a tolerance of 2mm or less. The drawer cabinet should be bolted to the arm via its base with the three bolts, as for the simple table version.

Bunyip



A Bundaberg Fowler 0-6-2T in 7¼" gauge — part 16

by Ian Smith

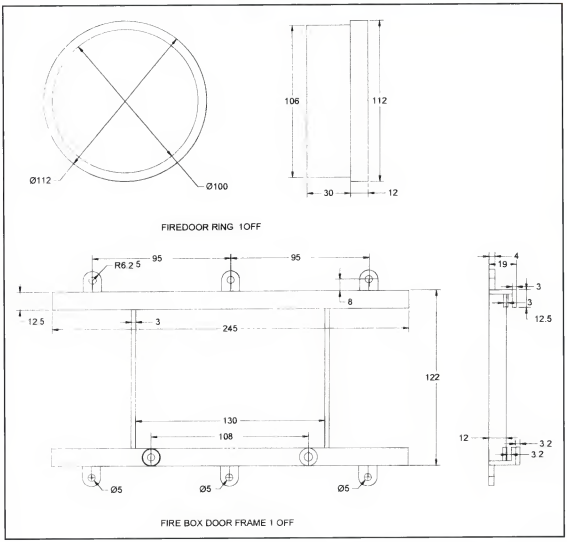
Drawings and photos by the author unless credited otherwise

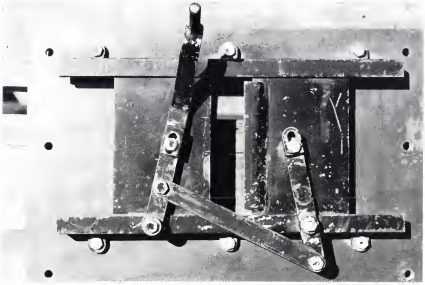
The firebox front plate has a 106mm hole cut in it 90mm from the top and in the centre of the plate. Turn a piece of 100mm ID x 6mm wall thickness tube to 106mm diameter x 30mm long and part off 12mm from the shoulder. Reverse in the chuck and turn a 3mm radius on the inside of the tube to remove the sharp edge so you will not cut your hand when putting lighting-up material into the firebox. Do not fix the tube into the plate until the fire door frame is made.

The frame for the firehole sliding doors is made from two pieces 20mm x 20mm x 3mm MS angle x 245mm long. Clamp the angle to the milling machine table, parallel to the table travel and machine one leg of the angle to 12.5mm high. While it is in that position machine out the radius in the corner of the angle so the doors will slide along it. In the centre of the length of angle, using a 3mm slot drill, mill a slot 30mm long to let any small grains of char drop through rather than getting stuck between the doors and stopping them from closing. Now machine the other leg to 19mm high. The six bolting lugs are made from 12mm wide x 5mm thick MS x 44mm long with a 4.2mm hole drilled 8mm from one end. The other end has a 6mm radius. Cut two 9.5mm wide x 3mm thick MS x 245mm long. These are stitched welded on to the angle using a 3.2mm spacer between them. Straighten the angle after welding so the fire doors can slide freely in the groove. Cut another two pieces 12mm wide x 3mm thick x 116mm long. These are welded in 65mm each side of centre. At each end you will have to step the ends down so the back and angles are flush. Now set the bolting lugs up to 95mm either side of centre and weld. Turn two washers 12.5mm diameter x 3.2mm thick with a 4.2mm diameter hole drilled in the centre. Silver solder the washers 54mm either side of centre, drill 4.2mm diameter using the washer as a guide and tap M5.

Set the fire door frame up on the backhead plate, centre the frame to the firehole and square across the plate.

Just to whet your appetite — Len Cottrell's Bunyip from Diamond Valley at Wagga Wagga, November 2000 Photo: Phyl Oliver

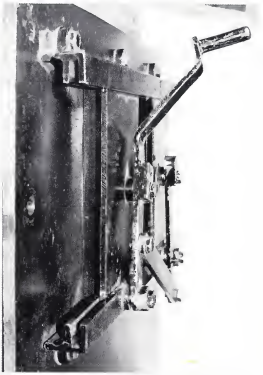




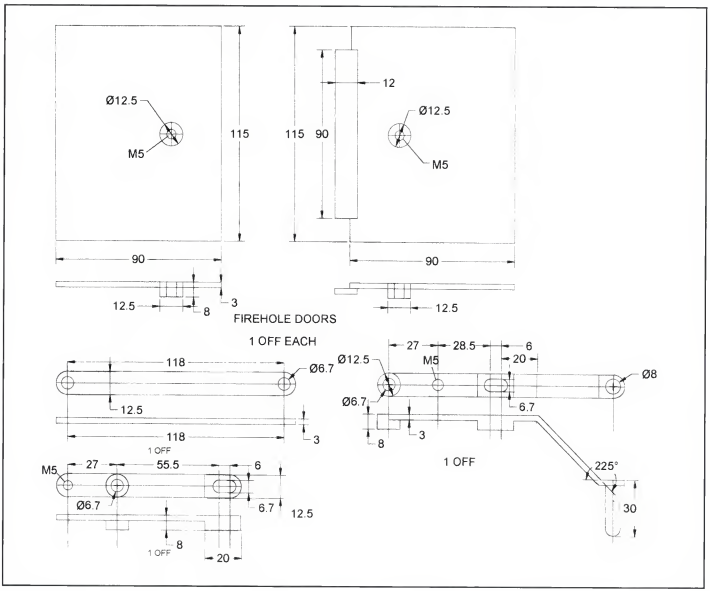
The assembled door and frame on the plate ready to fit Photo: D Proctor

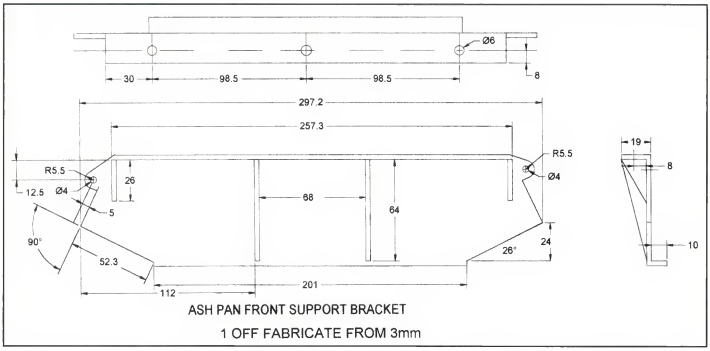
Drill holes in the plate 4.2mm diameter using the frame as the drilling jig, tap mm M5 and then open out the holes in the frame to 5mm diameter. Fit the fire door tube to the plate. You will have to cut two steps in the tube to make it all go together, and put four small weld runs on the tube and plate on the fire side of the plate.

Cut two fire doors 69mm wide x 3mm thick x 115mm long and one strip



Side view of the sliding channels Photo: David Proctor



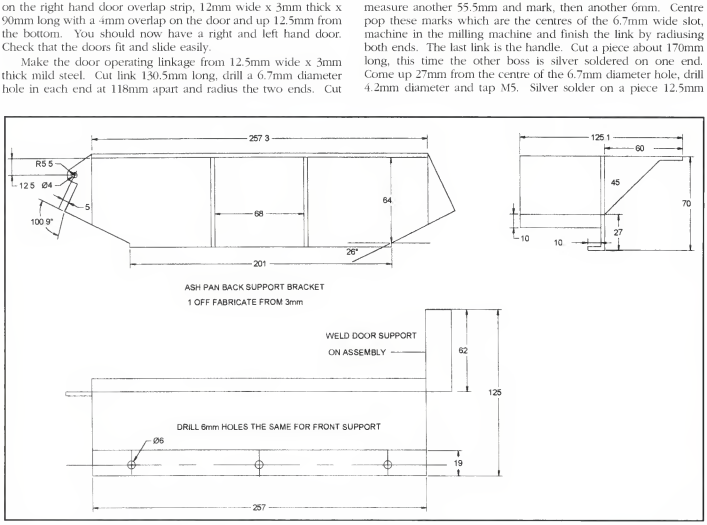


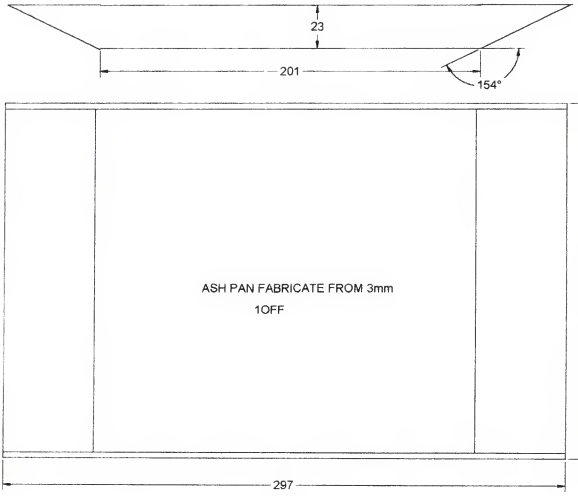
ASH PAN FRONT SUPPORT BRACKET

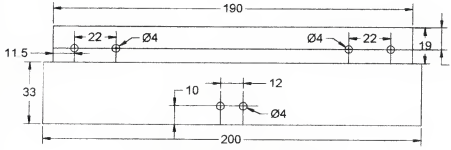
1 OFF FABRICATE FROM 3mm

12.5mm wide x 3mm thick x 90mm long for the door overlap on the right hand door. Drill a 8mm diameter hole in the two doors 27mm in from the 115mm long edge and 57mm from the bottom edge and cut a small countersink on the inside of the doors for welding. Turn two bosses out of 12.5mm diameter MS, turn down to 8mm diameter x 3mm long and turn a small 45° chamfer on the end. Drill 4.2mm diameter and tap M5. Press in the bosses and weld and then grind the weld flat to the back of the door. Weld on the right hand door overlap strip, 12mm wide x 3mm thick x 90mm long with a 4mm overlap on the door and up 12.5mm from the bottom. You should now have a right and left hand door. Check that the doors fit and slide easily.

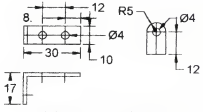
Make the door operating linkage from 12.5mm wide x 3mm thick mild steel. Cut link 130.5mm long, drill a 6.7mm diameter hole in each end at 118mm apart and radius the two ends. Cut another piece 100mm long, come in from one end 6.25mm and drill 4.2mm diameter and tap M5, then another 27mm and drill a 5mm diameter pilot hole. Turn two bosses 12.5mm diameter x 5mm thick and drill a 5mm pilot hole. One gets silver soldered on the link using the 5mm diameter hole as a guide for location, then move down to the other end and silver solder on a piece of 12.5mm wide x 5mm thick x 20mm long MS. Open out the 5mm hole to 6.7mm diameter and from the centre of the 6.7mm hole measure another 55.5mm and mark, then another 6mm. Centre pop these marks which are the centres of the 6.7mm wide slot, machine in the milling machine and finish the link by radiusing both ends. The last link is the handle. Cut a piece about 170mm long, this time the other boss is silver soldered on one end. Come up 27mm from the centre of the 6.7mm diameter hole, drill 4.2mm diameter and tap M5. Silver solder on a piece 12.5mm



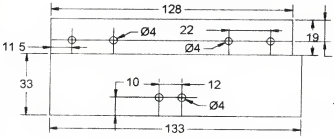




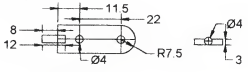
LEFT HAND SIDE ASH PAN DOOR
1 OFF 2mm THICK



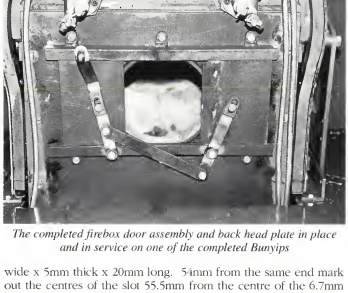
DOOR LIFTING BRACKET
2 OFF 2mm THICK



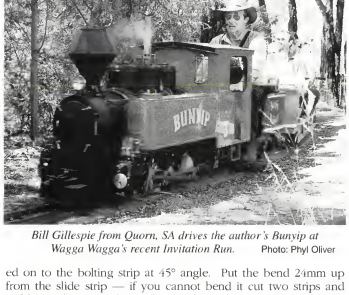
RIGHT HAND ASHPAN DOOR
1OFF 2mm THICK



HINGE 4 OFF



The completed firebox door assembly and back head plate in place and in service on one of the completed Bunyips



Bill Gillespie from Quorn, SA drives the author's Bunyip at Wagga Wagga's recent Invitation Run. Photo: Phyl Oliver

wide x 5mm thick x 20mm long. 5·4mm from the same end mark out the centres of the slot 55.5mm from the centre of the 6.7mm diameter hole and another 6mm and slot the same as for the other link. Mark a line 81mm up from the centre of the 6.7mm hole and bend the link to 45°. Move up another 50mm and bend back 45° the other way. Mark the centre of the handle 8mm up from the bend and drill 6mm diameter. Turn a piece of 8mm diameter BMS x 30mm long down to 6mm diameter x 3mm long and radius the other end and silver solder it into the link. Turn up four bushes 6.5mm diameter x 8.2mm long with a 5mm diameter hole and two 6.5mm diameter x 3.2mm long. Using M5 hex head bolts, assemble the links and try the movement of the fire doors — the 6.7mm slots may have to be adjusted a bit.

Ashpan

The ashpan and its front and back support brackets are fabricated out of 3mm MS sheet. Cut two pieces 19mm wide x 270mm long for bolting to the underneath of the firebox foundation ring (trim them to length after the side frames are cut out) and two 10mm wide x 201mm long for the bottom runners for the ashpan to slide on. Cut a strip 64mm wide x 300mm long for the front support bracket and mark out to the drawing, drill the two hinge pin holes and cut to shape using a bandsaw. Cut the four gussets and make sure the top is 90° to the side as it will help to keep the support square. Cut the bolting strip to length and drill the three bolting holes 5mm diameter for M6. Clamp it to the underneath of the firebox foundation ring, flush with the front edge and centered across the foundation ring, and spot the holes and drill and tap. Open out the holes to 6mm diameter. Clamp the support together and weld. Straighten if it has bent in welding and bolt onto foundation ring.

The back support has a 45° bend in the side and is also welded on to the bolting strip at 45° angle. Put the bend 24mm up from the slide strip — if you cannot bend it cut two strips and weld. Mark out to shape like the front support but there is no hinge pin boss on the right hand side. Cut out to shape. Cut to size and drill the other clamp strip the same as the front one and fit to foundation ring as before, cut the two gussets, clamp together and weld. There is a small nose piece were the hinge boss was — the reason for the 62mm piece is that you only have a small door on the right hand side. Put a 90° about 10mm up from the bottom and fit the other edge hard up to the foundation ring, bolt up the back support and check the opening between the two support brackets. When you make the ashpan give it about 3mm side clearance. Make the two doors now. They fit on the outside of the brackets so they won't slip inside the brackets, make the four hinge pins then set the doors up on the brackets and spot the holes for the 4mm diameter bolts. Drill and bolt the hinge pins on and check that they will open freely. On the right hand door where there is no hinge pin boss make up a saddle clamp out of 8mm wide x 2mm thick strip. The door does not overlap the nose piece, it fits flush with it. The lifting brackets need no explanation. Make to the drawing and bolt on with the lug facing to the back of the firebox but do not fit them yet — you will need to make the lifting links.

Cut the ashpan pieces and weld together. Slide the ashpan in between the brackets — if the ashpan is not letting the doors close just file a bit off the front edges of the ashpan, DO NOT make it a rattling good fit.

To be continued ...

News Desk

with David Proctor

Welcome to the new century! Firstly, a couple of points from the last issue. Following Kevin Bruderlin's article on trackwork I have had some correspondence regarding superelevation. This issue was fully discussed and clarified in *Letter Box* a couple of issues ago. Simply, the article was here before the correspondence began and I overlooked it when I placed Kevin's article in the magazine.

I really stuffed up with Bob Kimber's *Handy Hint* on leaf springs on page 36. I managed to somehow make step 3 into step 1. The item was lifted from a club newsletter and something happened in the process. This is how the article should have read:

1. Cut leaves to width and length and drill any holes needed, and roll to desired camber.

2. Heat to bright red and quickly drop in oil bath. Used engine oil works well.

3. Taking each leaf by one end with pliers, heat evenly with gas torch till flame from burning oil fades and drop in cold water.

The same treatment has been applied to coil springs with success.

Readers may rest assured that I have been suitably taken to task by the honorable Mr Kimber and hopefully the minders will not have to call now!

Can you help?

One of our readers is looking for suppliers for (a) "Minor" fractional HP 240v electric motors of around 950 and 1440 RPM, (b) micro speed reduction gear boxes for use with these motors and (c) a reliable gear-cutting firm for small gears. If you know of any please contact me.

Sparks 'n' Arcs

We are looking for more material for this popular column devoted to electric traction. The originator of the column, Stan Allison, who has done a wonderful job over the last couple of years is, for reasons of health, having to curtail his commitment. If you have any ideas or experiences to do with electrically powered models, how about telling us about them.

(Continued on page 55)

Universal Lever Type Dial Gauge Holder

By Murray Lane

Drawings and photos by the author

For those not familiar with the lever type of dial test indicator as seen in **figure 1**, the round head of the small lever at the base is the point from where movement is measured. When it is in the normal position it is set to read zero by swivelling the dial as in the normal type of DTI. Any movement of the ball will move the pointer around the scale. Movement in the opposite direction will move the pointer the other way. The movement of the ball is much less than the normal DTI, but is more sensitive. A clutch in the mechanism allows the lever to be swung in a 120° arc from the central position, which is pointing straight down

I watched a tool maker recently, using one of these dial test indicators to line a machine vice up on a milling table. The indicator was attached to the cutter collet head by a pot magnet, via a short assembly of links, which were in line with the end of the indicator. There were no off sets as with other types of DTI holders.

This holder, used with the lever DTI, is a very small unit with a small clamping area and as such is very useful for model engineering where our machines are usually small, and it is often difficult to set up the standard DTI and stand. Even with larger machines there is quite often no place to attach a magnetic base. On my Abene milling machine the DTI ends up on the end of a 350mm arm when aligning the vice. As you can imagine, this is not the most stable of set ups. Most milling machines that I have seen do not seem to have a suitable flat surface in a convenient location to clamp the magnetic base to.

The Mitutoyo catalogue lists a universal type under the series 513 indicator, but does not give any details of the accessories. When I bought mine the set only included, 4 and 8mm diameter stems, a swivel clamp, and an arm which can be held in a vice.

For accurate machining it is not wise to rely on the alignment keys set in the base of the vice. Small distortions in the table slots will prevent movement of the vice if the blocks are a perfect fit. When the keys are a loose fit they are of no use. I have removed these from my vices as it is much more convenient to be able to slide the vice freely on the table. When set across the table in the normal position I know that if I push it back against the hold-down bolts that the fixed jaw is almost parallel to the longitudinal axis of the table. If the vice can be swivelled, and most machine vices can, the position graduations can only be used as a rough guide.

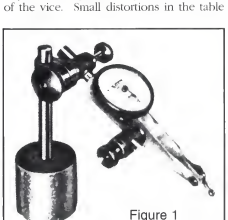


Figure 1

The holder described here is easy to make, and can be used for most alignment tests, with the machine head in close proximity to where it is going to be used. **Refer to drawing opposite**

Lets start with the reference point which is the mill head. This would normally be the cutter collet holder. The DTI holder is attached to the face of this with a 1"diameter Eclipse pot magnet. Check that the nose cap is nipped up and not loose before attaching the holder. This can be slid around the face of the collet head as required.

The Pot Magnet Adaptor screws into the other end of the magnet. Check the thread in the magnet before making this unit as they are not always the same.

The plain end of the **Joiner** screws into the adaptor. A small button is fitted in the other end of the joiner. One of the two **Arms** is passed through the **Swivel Head** until the ball end is inside. The swivel head is then screwed into the joiner and tightened. The arm will now be locked in the place at which it was set. Any of the **DTI clips** can now be screwed onto the end of the arm, and the DTI slipped into vee groove on the other end of the clip, and tightened up. If the standard clip is used the clip ring will need to put on first. This ring is included in the DTI set.

If the DTI is being used in line with the holder, clip it in the end vee. Use the other vee if it is to be used at right angles to the holder. **Refer to figure 2**.

Construction

1. Do not use mild steel. Some of the parts are quite small and easily damaged accidentally in use. I found that when turning the ball ends that the high tensile steel prevented any movement with a long over hang. It is recommended that this be left in the natural state. Do not use silver steel, it does not have much strength in the natural state, with the slim sections required here. There is a chance that it will be more brittle if hardened and tempered.

2. It is not necessary to use all the measurements as shown. Some are critical. Ensure that the diameter of the arm is smaller than the diameter of the ball, and of course the internal diameters of the swivel head must match these.

3. The four slots in the swivel head must be wide enough to allow the narrow part of the arm to slip down them. The depth of the slots is such that the arm can be swung through more than 90°. Any where from 95° to100° would be fine.

4. Some of the parts may not be required. As shown the unit is universal in allowing different fittings to be used. The pot magnet adaptor could be omitted, with the joiner modified to screw directly into the magnet. Only one arm may be required. Using the direct DTI clip saves screw cutting the outside of the standard DTI clip, and the clip ring would not be needed. It could be possible to leave out the joiner button and machine a similar part directly onto the end of the joiner.

5. When making the arms, drill the 2.6 mm hole before parting off. If you do not have a spherical turning unit (the ball must be truly spherical) a $^1/_4$" ball bearing can be used. Seal in a small container with soap (not liquid), and heat up red hot and allow to cool down slowly. The ball will now be soft and can be machined. Put it in the lathe chuck and drill $^3/_4$ of the way through and tap 4 BA or 4mm. Machine the end of the arm to suit and screw the ball on with Loctite®. There is no need to harden the ball again.

6. When machining either of the DTI clips, machine completely including the vee grooves, before parting off. The vee

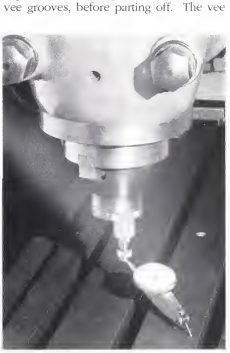
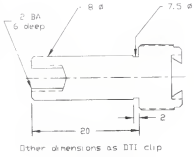
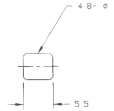


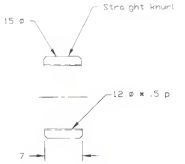
Figure 2



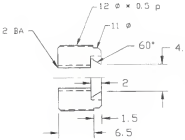
8 MM CLIP



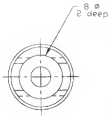
JOINER BUTTON

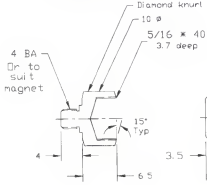


CLIP RING

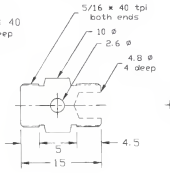


DTI CLIP

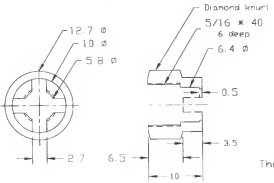




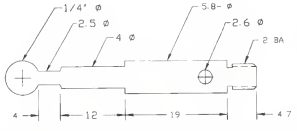
PDT MAGNET ADAPTOR



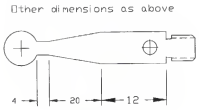
JOINER



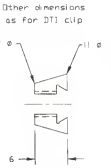
SWIVEL HEAD



LONG ARM



SHORT ARM



DIRECT DTI

NOTE: Chamfers 0.5 mm
Materials 4140 steel or better

DTI HOLDER

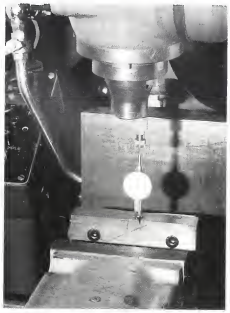


Figure 3

grooves can be filed with a triangular needle file with the rod held in a vice. File so that it is a neat fit on the DTI tracks.

7. Machine the internal thread side of the swivel head first. Turn the outside dimensions and knurl the raised section and clean the edges. Drill through at 5.8mm, and follow with a 6.4mm drill 9.5mm deep. Open out to $^{9}/_{32}$" and tap $^{5}/_{16}$" by 40 tpi. Part off at 10mm plus. Screw on to an arbor with a female $^{5}/_{16}$" by 40 tpi thread on the end. I have a drawer full of brass arbors around 60mm long, with all the common threads I use. These have female threads at one end and male threads at the other end. Face off the end until the internal spigot is 5 mm long.

Set vertically in a dividing head on the mill and cut two slots 3.5mm deep, through the centre at right angles to each other. A $^{3}/_{32}$" wide slitting saw set over 0.1mm either side of centre, will give the correct width of 2.5mm plus.

8. The joiner is made in a similar fashion. Drill the 2.6mm diameter cross hole before parting off. The grooves at the end of the threads should be slightly deeper than the thread depth, and around 1mm wide. After the thread has been cut, turn the die around and run it down so that the thread is formed fully to the slot. The normal side of the die leaves a considerable taper on the end of the thread. Many of my dies have been ground down on the reverse side to allow threads to be formed almost to a shoulder.

9. The pot magnet adaptor is made in the same way.

The parts shown on the drawing, are similar to those supplied with some lever DTIs. I have designed them so that the threads and diameters used are in the average model engineer's tool kit. The thread where the clip ring screws onto the DTI clip is what my DTI is fitted with.

If you have lever type DTI, and it does not have vee type fixtures, there should be a fitting which can be attached to the of the DTI. The end of this could be tapped to accept the holder.

What can it be used for on a milling machine

1. The most common use of a DTI on a milling machine, is aligning the fixed jaw of a vice with the main table. This can be parallel or at right angles to the table. Refer **figures 3 and 4a**. Adjust position of vice until the reading does not change as the table is moved in the required direction.

2. If your mill has a facility to allow the vertical head to be swung away from the vertical position, it will be necessary to check the alignment of the head when returning the head to the vertical position. Refer to **figure 2**. Rotate mill head through 360°. Adjust head angle until the reading remains constant. Only high class mills have stops that can be relied upon to be used when returning to the vertical position. A tool maker will still check for any run out. This procedure can also be used to check that a dividing head is set vertically. Use the chuck face or a face plate as the measuring surface.

3. The DTI can be used to find the centre of a bar in the vice. I watched the tool

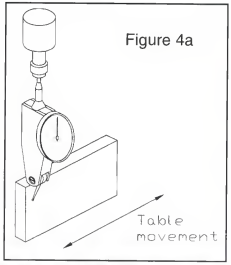


Figure 5a

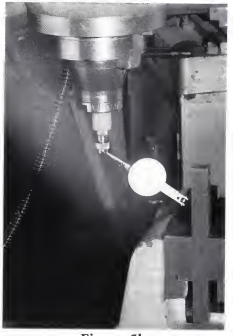
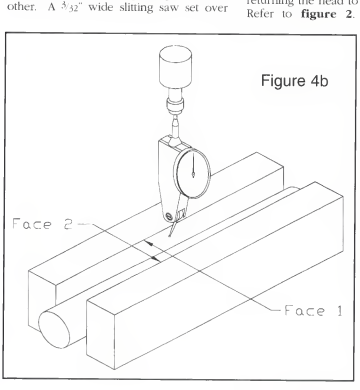


Figure 5b



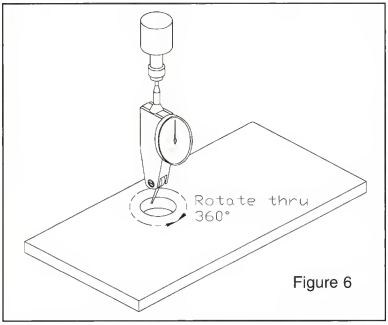


Figure 6

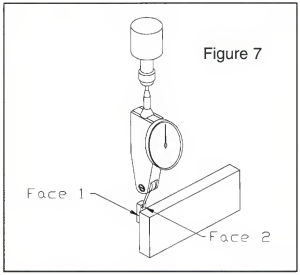


Figure 7

maker referred to at the beginning of this article, centralise a small job quicker than using a wobbler and the digital display. Centralise by eye as close as possible. Adjust DTI until it is reading on one side of the vice, rotate head of mill 180° and check reading against the other jaw. Adjust table position to half the difference in readings. The work piece is central when both readings are the same. Refer to **figure 4b**.

4. It can also be used to line up work in both vertical planes. Refer to **figures 5a & 5b**. Move table up and down, or the quill if your machine is fitted with one. Adjust work piece until reading does not change.

5. Locating the center of a hole. Refer to **figure 6**. The hole is centralised when the reading does not change when the mill head is rotated through 360 degrees.

6. Centralise a vertically mounted dividing head or a rotary table. Same as above via the hole in the center of the devices. Carry out item 2 first, for the dividing head.

7. Check that the work piece held in a vice is level with the table. (a) Some times a piece of swarf under the work piece, (b) a non parallel packer,(c) or the base of the vice between the jaws is not level. Any of these can tilt the work piece.

8. The above also applies to the work piece across the jaws. The moving jaw (even in a good vice), will lift the work piece on that side.

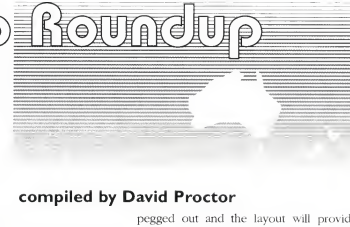
9. Locate the edge of a work piece. Refer to **figure 7**. Centralise the ball on the end of the arm by eye. Move the table until a small reading is obtained against the edge of the work piece. Drop the table down until ball is clear of the edge. Hold a piece of tool steel firmly against the edge, rotate mill head 180° and note reading. When both readings are the same the edge is lined up with the centre of the mill spindle.

How's This for a Simple Linisher!

Do you have a belt sander gathering dust around the place some where? Harold Sinclair, one of New Zealand's more prolific locomotive builders, has adapted his to make a linisher, which can be held upside down in the vice as these photos show. The third photo shows one of the uses Harold puts it to. He makes his connecting rods each from three pieces and then welds them up. Once he has given them a taste of the linisher, you would never know they were fabricated.

Photos by Charlie Lear

Club Roundup



compiled by David Proctor

Adelaide SA

The Annual Inter-Club Run was again held in September. Saturday started out cool, grey and quite damp, but that did not influence the activity at Railway Park. A different feature this year was a largish lake under the low bridge, a result of the recent rain. The day cleared by lunchtime and everyone had a great time.

As well as some solid new picnic tables, the club now has a char hopper bin which has made handling easier and freed up some storage space. Two prefabricated switches have been cut into the entry road of the truck shed and to give future access to the fourth siding and head shunt.

Adelaide Miniature Steam Railway Society Inc.
Location: *370 Regency Road, Prospect*
Public Running: *4th Sunday*

Auckland NZ

A partly built freelance radial aero engine was Alan Roberts contribution to the latest Bits and Pieces night. It is a 9-cylinder glo plug rotary of 50cc total volume, designed to fit in a 7¼" circle and eventually to power a 88" wingspan plane. Also in the line up were holding down clamps for shaping or milling machine use where the top of the clamped work has to be machined over its whole surface and a special jig for accurately grinding small engineer's vice jaws. A large copy of a drawing from an 1899 *Machinery* book of a large triple expansion engine, the point being that whoever did the original had to draw it in reverse, one line at a time on a copper plate to enable it to be printed.

Auckland Society of Model Engineers Scale Marine Modellers
Location: *Shared facilities at Petersen Road Reserve, Waipuna Road, Panmure*
Public Running: *Every Sunday*

Balcatta WA

The 5"/7¼" ground level track is coming closer to being a reality. Ernie Redford has been designing and setting up track manufacturing jigs. The points are to be the moving frog type as used by SASMEE and in Canberra. Doug Brennan has been steadily producing concrete sleepers, using moulds made by Ernie.

On the smaller side, the proposed Gauge 0/Gauge 1 garden railway has been pegged out and the layout will provide three separate parallel tracks in a large oval, joined by points for working between the different loops. All will be dual 32/45mm gauge. Doug Baker has been working on jigs for track building which he expects to be well under way by the time this is being read.

Mike Rogers has successfully run his 5" *Sweet Pea*, a very creditable first attempt. Steve Reeves and Phil Gibbons are working on a joint project, a *Bloufly* club loco. The part built loco was acquired from a former junior member of the club and the chassis has been successfully run on air.

Public Run days have really taken off — in July never before seen numbers turned out for rides, while in September there were six locos in steam at one time, a record number. Improved advertising, word of mouth and some really great weather have all contributed to this success.

Northern Districts Model Engineering Society
Location: *Vasto Place, Balcatta*
Public Running: *Last Sunday*
Website:http://www.livesteaming.com/clubs/club_pages/perth.html

Bathurst NSW

With the fast approach of the NSW Interclub Run in May 2001, there have been a number of working bees to finalise the upgrades to the track and facilities. These include a refuge/passing loop in the main straight, which was to have been a crossover to allow for a quick change to reverse running, and an additional set of points providing improved access to the carriage sidings, which with the addition of a coal bunker, will serve as ground level steaming bays.

Bathurst Miniature Railway Co-op Soc
Location: *John Matthews Sports Complex, Durham Street, Bathurst*
Public Running: *3rd Sunday*

Berry NSW

Work is well under way on the new track site. The building containing the station/storage area, clubroom and toilet block is up, with platform at the front and unloading and steaming bays at the rear. The mainline bridge over the dam is in place and the old Warren truss bridge from Les Boyd's place will be installed after some modification for use on the loop bridging the overflow from the dam.

Berry Railway Inc.
Location: *PO Box 324, Berry*
Public Running: *None*

Bracken Ridge Qld

The Bracken Ridge Central Lions Club is pleased to announce resolution of questions relating to registration under WH&S and insurance of locomotive operations. A letter has been received from the Department of Employment, Training and Industrial Relations confirming we have no requirement to register as an amusement device and can continue to operate as a miniature railway.

Insurance for locomotive operations has been arranged through the Lions Clubs' insurers. Because it is an add-on to our other insurance it is cheaper than the AALS as we would have to take the complete AALS package, thereby duplicating the Lions' public liability and personal accident policies. Lions don't provide comprehensive insurance for locos.

Named drivers only are covered, so if you intend visiting our track for a run, please give us a working day's notice to advise our insurer. You can contact Ross (Goldie) Goldspink on (07)3269 8544, fax (07)3869 3804 or e-mail goldicom@powerup.com.au

Copies of insurance documents are available for perusal at the track. We run the 4th Sunday of every month, fire up from 7:00am, lunch and drinks provided for drivers, char for locos. Visitors are always welcome

Bracken Ridge Central Railway
Location: *McPherson Park, Denham Street, Bracken Ridge*
Public Running: *4th Sunday*

Bulla Vic

To make life easier for passengers in regard to the insurer's requirements that all passengers wear enclosed footwear, a box will be held at the station which will contain a variety of sizes of shoes. This way shoes can be lent to intending passengers rather than turning them away.

The diesel outline loco *City of Broadmeadows* has been returned to service after an extensive rebuild and the workshop and carriage doors are to be changed to swinging doors due to the potential danger of tilt doors in high wind.

Some members of TLSS visited Wandong and Gippsland clubs and thoroughly enjoyed both.

Tullamarine Live Steam Society
Location: *15 Green Street, Bulla*
Public Running: *1st & 3rd Sundays*
Website: http://www.netlink.com.au/~rbritt/bullahill.html

Burnaby, BC Canada

The IBLS 2000 Meet is now a piece of history and what a success it was. There

were over 600 registered attendees and volunteers and 65 registered locomotives. As well as Canada and the USA, people came from Australia, England, Wales, Zimbabwe and a large contingent from New Zealand. The Kiwis brought a large Shay and two riding cars with them (owned and built by Dave Giles).

Now that the ground level 7¼" gauge railway is mostly complete, many members feel the time is right for a multi-gauged raised track.

Operation has now ceased on the Burnaby track until Easter as the cold weather and shorter days are at hand. The members do however have the six week long Santa Run at Lougheed Mall, which is a big income earner for the club.

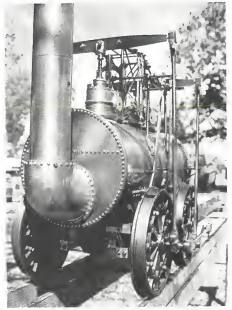
British Columbia Soc. of Model Engineers
Location: *Rainbow Creek Station, 120 Nth Willingdon Ave, Burnaby.*
Public Running: *Saturday, Sunday & public holidays, Easter to Thanksgiving*

Canberra ACT

The Annual Invitation Run was a most pleasant weekend with visitors coming from afar and again an interesting assortment of locomotives. Shawki Shlemon from WDLS (Fairfield) brought along his 7¼" gauge NSWGR 13 class tank loco — a nicely built model of a prototype rarely seen in this gauge. Peter Martin obviously liked it too as he appeared to be permanently attached to the driver's seat! Another unusual model was an extremely well executed part built 7¼" gauge *Locomotion* by Bill Henderson.

The saga of finalising agreement on the extra block of land at the rear with the ACT Government continues. After many years of negotiations and false outcomes, the end seems to be in site, with the licence agreement (lease) having been signed of the by the club and only awaiting departmental signature.

Canberra Society of Model & Experimental Engineers
Location: *Geijera Place, Kingston*
Public Running: *Last Sunday*



Bill Henderson's Locomotion Photo: D Proctor

Cobden Vic

As well as a busy time on their own track, members of the SWME have also been attending other clubs and functions such as the Model Engineering Exhibition at Monash University, the Point Richards Miniature Railway and in the case of Ron May, as an invited guest at the Diamond Valley Railway on the occasion of their 2,000,000th passenger.

South Western Model Engineers Inc
Location: *Grayland St, Cobden*
Public Running: *3rd Sunday*
Website: www.gatewaybbs.com.au

Eltham Vic

On Sunday 8th October the Diamond Valley Railway carried their two millionth passenger, quite a milestone by any measure. The lucky family received a glass cased model of a Victorian Railways "S" class diesel locomotive and a year's free travel on the DVR.

The 'work for the dole' scheme has started and so far the wetlands area has been cleared of excess reeds, the rock wall which separates the inner and outer circle lines has been installed, the pine sleeper retaining wall at the entrance to Rocla Tunnel is almost complete and another sleeper retaining wall has been started in Nillumbik yards.

Diamond Valley Railway Inc
Location: *Eltham Lower Park, Main Road, Eltham*
Public Running: *Every Sunday & pub hol.*
Website: http://www.railpage.org.au/dvr

Hamilton NZ

The members of the Hamilton club are gearing up for the club's 70th Birthday Bash to be held from 27 to 29 January. 70 years is a milestone for any club and this promises to be a weekend to remember with people likely to come from Australia and even the UK.

Wet weather has made for some very wet running days recently. The lake has been full to capacity and it has made for interesting running travelling through the water, but the public seem to love it. A luge is being built from the top of the hill in Minogue Park overlooking the track, yet another attraction to the area.

Hamilton Model Engineers Inc
Location: *Minogue Park, Tui Avenue, Forest Lake*
Public Running: *Every Sunday*
Website: http://expage.com/page/hmenz

Maidstone NZ

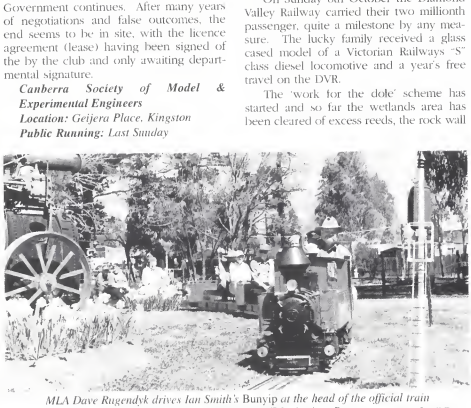
Work is proceeding on the ground level track construction and the last barrow load of concrete has gone into the track bed. An extra three sets of points are being built for the passing loop on the side near the hill. The points were plotted using a CAD program to full size on large sheets of paper and laid out on the workshop floor, which then served as patterns to work to. Once these points are complete work can continue on the making and laying of the track proper. Plans are also under way for a 7¼" gauge petrol engine loco to operate on the new track.

While the work on the new track continues another work group has been attending to landscaping and repairing the existing elevated track. In the process some gradients on the sides of cuttings are being eased to facilitate mowing.

Maidstone Model Engineering Soc. Inc
Location: *Maidstone Park, Upper Hutt*
Public Running: *Every Sunday afternoon October-April*

Millswood SA

The club house end of the 5"/7¼" track has been re-signalled. The track pressure switches and associated circuitry, necessary because of welded cross ties, have worked well but have their limitations. The introduction of plastic and slotted wooden sleepers has allowed the cross ties to be cut, allowing the use of low voltage continuous track circuits to control the signals, which will be extended through-



MLA Dave Rugendyk drives Ian Smith's Bunyip *at the head of the official train after performing the opening of the CSMEE Invitation Run* Photo: Geoff Ross

What has your club been up to?

We all like to keep in touch!

Send a brief note to tell us!

Or post a copy of your **newsletter** - but make sure you use a highlighter pen to show the item you would like us to publicize. Remember to concentrate on news that appeals to AME's wide range of readers.

out both railway systems.

The redundant SAR type water tank ex SASMEE Park Station has been cut down and will be mounted on four legs eight feet high, adjacent to the run-off from the 7¼" turntable. It is intended that it will carry some of the brand names associated with this type of railway equipment, and whilst not an exact replica, will be a good representation. The area where it stood is being redeveloped to allow enlargement of the coal crusher shed.

South Aust. Soc of Model & Exp. Engrs
Location: *off Millswood Cres, Millswood*
Public Running: *1st Sunday/3rd Saturday*

Eddington Vic

The LMSLS is a small club that for some years has been using an oval 3½" and 5" elevated track at Eddington in central Victoria. Our main news is that the club is now pushing ahead with a new 470 metre ground level 5" track which passes through attractive bushland, recently made available to the club. We anticipate that this new track will be completed and in use in April/May 2001.

Loddon Miniature Steam Loco. So.c Inc.
Location: *McCoy Street, Eddington*
Public Running: *4th Sunday, Apr-Oct.*

Newcastle NSW

Twenty club members and families assisted the Mudgee Miniature Railway during the Mudgee Wine Festival by providing locos to haul the public. A great time was had by all but the main form of entertainment seems to have been a two week old lamb. Members were spotted talking to it on all fours and walking it on a lead like a dog. As Saturday night wore on a certain president was heard to say "G'day dog! Ahh, that's right, you're a sheep". *(Says it all really, eh Jeff?).*

Work by the Land Care Group has commenced with the re-mediation of the banks of Cocked Hat Creek, which is the club's eastern boundary. All non-native vegetation is being removed, cardboard laid and then a layer of mulch is spread on top. About 10 cubic metres of mulch has been delivered through the help of the local Land Care group. Native trees and shrubs will be planted along the creek bank.

Lake Macquarie Live Steam Loco Soc Ltd
Location: *off Velinda Street, Edgeworth*
Public Running: *Last Sunday (ex. Dec)*

New Plymouth NZ

How's this for an unusual request? A member of the NPSMEE has been approached by a local theatre group whose latest production includes a cannon made from a cardboard tube. What they want to do is to fire it using a styrofoam ball as the projectile, which only needs to be shot 3 or 4 metres.

The time has come to do something about the traction engine. The club has put out the feelers with a view of either having someone take on the restoration project or should there be an offer too good to refuse, selling it.

New Plymouth Soc. of Model Engineers
Location: *cnr Liardet and Gilbert Sts, New Plymouth*
Public Running: *Every Sunday*

Perth WA

There have been more changes over recent months as a result of members efforts. Some dangerous trees and bamboo have been removed from the area around the Canning section, which is now almost ready to run on, only requiring the signal rodding to be connected up. Rubble has been cleared and the area is ready for grassing. The retaining wall near the entrance has also been started and the next big project is removal and replacement of the bridge.

Castledare Miniature Railways of WA Inc
Location: *Castledare Place, Wilson*
Public Running: *1st Sunday*

Salisbury SA

Plans for the 2001 Convention have been disrupted by the state government reneging on the written undertaking that they gave the PMES last April. The effect on the club is that an easement has been created to enable construction of a road which provides little advantage over the existing road. The track has been lifted and work is under way on the new ground level 5"/7¼" track which will be ready for the Convention — in fact the main loop should be ready for running by Christmas. Unfortunately there is not sufficient time to be able to replace the elevated 3½"/5" track and the club apologises to anyone who was contemplating running on the elevated track.

The lifting of the existing track started on Saturday September 23. The last run day was held as an interclub with a BBQ on Saturday 30th but the weather and short notice meant a small turnout of locos. Most present opted to continue with dismantling the track. The new track will run around the 1/4 scale race track, past the end of the club rooms, around the duck pond and back past the old station.

Convention Registration Forms have been sent out to all clubs and a discount is offered to those who return them by December 31. The club has a website for the Convention at:

www.steamengine.com.au/ralsconvention

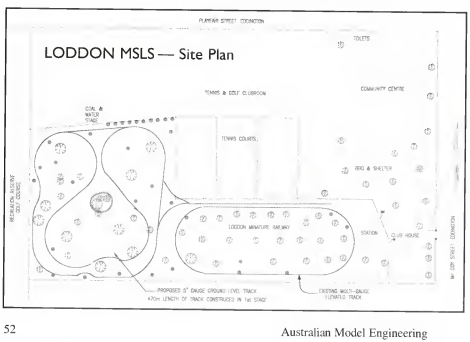
Penfield Model Engineers Society Inc
Location: *Penfield Avenue, Salisbury*
Public Running: *Last Sunday*
ClubWebsite: http://www.picknowl.com.au/homepages/joanlynn/pmesone.htm

Tauranga NZ

The workshop extension to the clubhouse is proceeding well and as the roof trusses are of the loft type, there will be additional storage space in the roof. The Committee have decided that an appropriate time to open the new facility would be the 21st anniversary of the joining of the Tauranga Model Marine Club with the new Tauranga Model Engineers Club.

The members' bus trip to the Bush Tramway at Pukemiro Junction was enjoyed by all, especially Eric Burns, who got to put F185 through her paces. *(F185 is an 0-6-0 saddle tank loco built by Dubs & Co in 1878 for the NZR ... Ed.)*

Tauranga Model Marine & Eng. Club
Location: *Memorial Park, Tauranga*
Public Running: *Every Sunday*



Vancouver Island BC

Member James Powell took his Britannia to the Ontario Model Loco Efficiency Trials (OMLET) where he came a very creditable second overall. The scores were calculated as ((load x distance)/weight of coal burned)/1000.

The club, along with the Harley Owners Group and the Saanich Historical Artifacts Society, co-hosted the Dream Picnic 2000, a nationally registered event for children facing major challenges in life. The event was an outstanding success and provided a lot of joy for the children who, because of their disabilities, miss out on a lot that others take for granted. Planning is already under way for 2001.

Vancouver Island Model Engineers
Location: *7321 Lochside Drive, Saanichton, BC, Canada*
Club Run Day: *2nd Sunday*
Website: http://www.pacificcoast.net/~trainman

Wagga Wagga NSW

At the AGM Ray Catts was elected President, John Lennon Vice President, David Font Secretary and Max Burke Treasurer. The Committee also incldes Les Mouat, Don McLean and Allan Macnamara.

The Invitation run was most successful though numbers were down a little, no doubt due to the current high cost of fuel.

Wagga Wagga Society of Model Engineers Co-op Ltd
Location: *Botanic Gardens, Willans Hill*
Public Running: *1st & 3rd Sundays*
Website: http://www.wagga.net.au/community/trains/

Whangarei NZ

The club is back on track with more members and big expansion plans at its new site in Heritage Park. Since the new 460m line was opened in January hundreds of passengers have enjoyed the ride and helped the club coffers. This success has bred success and support from the local business community. Thanks to a grant from the ASB Trust excavations are now under way to extend the track a further 700m to native bushland and which will include a tunnel, a viaduct and a level crossing (complete with operating signals, of course).

Whangarei Model Engineering Club
Location: *Heritage Park, Hwy 14, Maunu*
Public Running: *None yet*

Farewell

We say goodbye and thankyou to these model engineers who have passed on:

Frank Burke (Diamond Valley)
Gerald Dee (Tullamarine LSS)
Ralph Frew (Thames SGR)
Alan Jorgensen (Tullamarine LSS)

and extend our condolences and best wishes to the family and friends they leave behind.

Coming Events

27 to 28 January
Fifth Annual Cabin Fever Expo — USA
This is an exhibition devoted to all types of model engineering, one of the two most popular in North America. It will be held in the Lebanon Exposition Center, 2120 Cornwall Road, Lebanon, Pennsylvania (www.lebexpo.com). Contact Tony Wikrent, PO Box 253, Leesburg, VA 21078 USA, or e-mail jkwkdl@aol.com

27 to 29 January 2001
70th Birthday Bash — Hamilton NZ
A special invitation to all model engineers to help us celebrate our 70th Birthday. Track open 8am Saturday to 4pm Monday, food and drinks avail, all day to drivers, visitors and locos. Formal dinner Saturday night (please advise if interested), BBQ and night run (all Night) Sunday. Open to public each day 10am to 4pm. Shower/toilet facilities at track for those staying. Marquee seating avail. For catering purposes advise if attending to Valerie Ph. 64 9 8551 927 or email vclark@waikato.ac.nz

17 to 18 February
Open Weekend — Paraparaumu NZ
The Kapiti Miniature Railway & Assoc. will be holding an open weekend at their track at the Marine Gardens, Raumati Beach just north of Paraparaumu. 5"/7¼" ground level track, raised steaming bays, comp. Air and 12 volts. Billets if advised in advance, meals provided. Overnight loco storage. kapiti_miniature_railway@hotmail.com

24 February
48th Birthday Run — Edgeworth NSW
Members of Lake Macquarie LSLS invite you to help celebrate with them on weekend of Saturday 24th. Sunday afternoon is normal public running but visitors need not haul passengers. 3½"/5" elevated and 5"/7¼" ground level. Full camping facilities, refreshments avail. please advise for catering. All welcome with or without models. Contact Sec. Joe Huntley (02) 4954 0358

March
Model Boating Regatta - Cheltenham V
The Melbourne Model Boat Club wishes to invite all Scale Model Boating Clubs to their first Annual Model Boating Regatta to be held at the Sir William Friars Reserve, Cheltenham. The event will be held to coincide with the Melbourne Moomba Festival, an extremely good time to visit Melbourne. Contact: Melbourne Model Boat Club, 4/87 Medway St. Box Hill North, Vic 3129.

13 to 16 April
AALS Convention - Salisbury Nth. SA
The Penfield Model Engineers Society is hosting the AALS Convention at the Penfield Park railway grounds in Salisbury North, part of the Adelaide metropolitan area. See under club heading in *Club Roundup*. Registration forms and full details have been sent out to all clubs. Convention Secretary, PO Box 792, Salisbury SA 5108. Convention website http://www.steamengine.com.au/aalsconvention

20 April to 7 May
Cane Locomotive Gathering - various
Full itinery on page S9 last issue. Full and final details will be in the March issue of AME. Two week safari over several tracks, club and private, restricted to locomotives which are modelled on those which served the sugar cane tramways. Contact Andy (07) 4954 1206 or Mark (02) 9644 1131

1 to 13 May
North Queensland Safari — various
Come and enjoy two weeks in the sun! Run on S different tracks from Maryborough in the south to the idyllic Pinnacle Village at Wonga Beach in the north — 7 days running! See page S8 last issue for full details. Contact Len Heaton (07) 4959 2169

19 to 20 May
NSW Interclub Run — Bathurst NSW
Bathurst Miniature Railway Soc. have a ground level 3½"/5" track with a main line of 550m. Modified forklift unloader to elevated turntable. Elevated and ground level steaming bays with water, 240v power and comp. air. Char will be provided. Contact Garry Sewell (Secretary) on (02) 6331 6886 or e-mail gsewell@ix.net.au

9 to 10 June
Annual Steam, Horse & Vintage Rally — Echuca Vic
The Campaspe Valley Railway together with the Rotary Club of Echuca invite you to their big annual event. 5" and 7¼" tracks. A major Victorian steam rally with a large collection of steam rollers traction engines, etc. Book accommodation early. On site camping, no washing or power. Contact Ross Walker 0418319780 or (03)5480 7206

24 June
Bracken Ridge Central Annual Birthday Run — Qld
Prizes for best QR loco and Best loco overall. Lunches and drinks provided for drivers and crew, char provided for locos (if you use coal it's BYO). Contact Goldie on (07) 3269 8544, Neil (07) 3261 2042 or e-mail goldicom@powerup.com.au

7 to 8 July
Timbertown Rally — Wauchope NSW
The Timbertown Steam & Oil Engine Club are hosting this rally and invite you to come along. Vintage and heritage machinery, tractors, 5"/7¼" ground level railway (under construction - watch this space), stationery engines. Contact Ian Strawbridge (President) (02) 6587 4455 e-mail info@webmaker.com.au or Bob Radnidge (Secretary) (02) 9918 6430

2 to 4 November
Invitation Run — Wagga Wagga NSW
Contact David Font (Secretary) on (02) 6921 4762 or e-mail dfont@tpg.com.au

10 to 14 January, 2002
Modex 2002 - Palmerston North, NZ
The Palmerston North Model Engineering Club is hosting MODEX 2002, the NZ International Convention and Exhibition. More details on this exciting event will be published in later issues. Contact address is MODEX 2002 Registrations, 21a Hereford St, Palmerston North, New Zealand. Ph. 64-6-355-7000, Fax 64-6-355-7008 or email pnmec@clear.net.nz

Anybody for Steam Turbines?

by Bob Weir

Drawings for publication fron the author's originals by Paul Trevaskis

I introduce this subject with considerable reservation as it seems to be from a period of yesteryear when engineers were constructing model steam boats to break speed records. Flash steam boilers and reciprocating engines provided the motive power. Small internal combustion engines had not reached a degree of reliability acceptable amongst our engineering fraternity.

One aspect of this challenge to secure an international speed record (incidentally held by the Sydney Society of Model Engineers in the late 30's by Ron Cowan's *Sunbeam* clocked at 49.29 mph) was the lack of success of the steam turbine. At first glance the use of a steam turbine seemed to be so obvious, incorporating mechanical simplicity, no valve timing problems, no out of balance forces, just a compact light weight unit.

But alas the unforeseen problems of low turbine efficiency and highly stressed speed reduction gearing daunted the minds of even the most talented in the field — Professor D H Chaddock and Jim Bamford, to quote but two in the UK, finally leading to abandonment.

Which brings me to the point of this article — are you ready for it?! Yes, a mildly technical analysis of model steam turbine design with a suggestion as to how to bring the "demon" of excessive rotor speed under control. I do not intend to offer a design for construction at this stage, but rather to examine the fundamental principles with the object of receiving comment from my fellow model-making engineers.

The problem of steam turbine design for model engineering purposes reduces to extracting the maximum heat energy out of the available steam for conversion into mechanical work using as few turbine rotors as possible running at an acceptably low speed. So simplicity is the hallmark — one rotor and either no gearbox or only a small reduction to achieve the desired output speed would be ideal.

The conversion of heat energy into kinetic (mechanical) energy takes place in a steam nozzle where the expanding steam imparts to itself an acceleration resulting in a very high velocity at the nozzle exit. This is the source of our problem. Shown below are the theoretical exit speeds (no friction or turbulence losses) for various inlet pressures exhausting to atmospheric pressure:-

Table 1

Inlet pressure (psig)	15	30	60	80
Exit velocity (fps)	1615	2000	2450	2600

So even at quite low pressure (15 psig) the exit velocity of the steam is very high, resulting in a rotor speed of about 60,000 revs/min for a 3" dia. wheel under full load. At no load the speed could approach a theoretical 120,000 revs/min. Try to design and construct a gearbox to operate at those speeds. Many shed gear teeth and disintegrated spectacularly! This problem is not confined to model engineering — full size turbines have the identical problem and a number of ingenious solutions have been devised:-

(1) Reduction gearing was first applied to the simple impulse turbine, but even with a much larger rotor than we model engineers use the rotor speed was very high resulting in a gearbox many times larger and heavier than the turbine itself.

(2) Velocity compounding was an early favourite where the jet of steam issuing from the nozzle was directed across the rotor blades as many as four times, there being a set of stationary blades mounted on the steam exit side of the rotor to collect and return the steam across the moving blades, until finally the energy (velocity) of the steam was spent. In this way the rotor speed

A simple impulse turbine of the De Laval type

could be reduced to about 40% of the simple impulse rotor speed.

(3) Pressure compounding is the most common method currently used and is essential for reaction turbines. With this approach the turbine is divided into pressure tight compartments, each containing a rotor and nozzle. The pressure is let down by stages, each stage operating at a lower pressure than its neighbour. The pressure difference between stages is kept sufficiently low to achieve a manageable exit steam velocity from each nozzle. In the essence a number of single rotor turbines all stacked side by side on a common shaft.

These solutions are frequently combined to achieve the desired output speed for marine propulsion or electric power generation.

Now to a little elementary mechanics. The kinetic energy (energy of motion) of the steam leaving the nozzle is:-

Equation 1

$$KE = M.\frac{V^2}{2gc}$$ foot pound force (ft.lb.f)

Where

KE = Kinetic Energy - ft.lb.f

V = Velocity of the steam - feet per second

m = mass of steam - 16 m

gc = constant - 32.2 ft lb/ 16f sec^2

With the exception of solution (1) above, using a gearbox, all the remainders achieve speed reduction by playing tricks with "V" — the steam velocity. By returning the steam jet across the rotor blade a number of times in the case of velocity compounding, or only letting a small value of V occur at anyone time by controlling the pressure difference across the nozzle — pressure compounding (read nozzle and blades for reaction turbines).

However to the best of my knowledge nobody has looked into playing tricks with "m" the mass of steam flowing through the nozzle. At first glance this approach seems unworkable but is this really so? How can one increase the mass of steam flowing through the nozzle. Well try the following

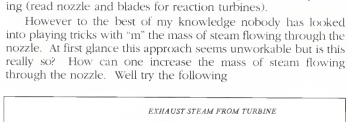


Figure 1

A special nozzle is constructed incorporating the usual steam nozzle, passing high pressure steam from the boiler (primary steam). On the exit side of this nozzle a number of mixing cones are mounted to direct the static exhaust steam contained in the turbine casing into the primary jet. So the initially static exhaust steam is mixed with the high velocity primary steam and accelerates to some intermediate velocity to form a secondary steam jet. So we have achieved three things:-

- We have slowed the primary steam velocity.
- We have increased the mass of steam flowing.
- We have maintained (theoretically) the energy available from the jet.

I have elected to name this approach "Mass Compounding".

Providing the mixing takes place reasonably efficiently, we have not wasted much energy and from a thermodynamic point of view the heat properties of the expanded primary steam and the exhaust steam are similar, so there should be no heat transfer losses.

The increased mass of steam (primary plus secondary) flowing across the rotor and stationary return blades will require an increase in blade passage size, but this is of minor consequence.

Getting back to model turbines — what can be achieved using all of the above?

Let us first examine how much exhaust steam has to be mixed with the primary steam to achieve a halving of the primary steam jet velocity.

Using the same kinetic energy formula and nomenclature as above but modified as follows:

V_1 = Primary steam jet velocity

V_2 = Secondary steam jet velocity

M_1 = Primary mass of steam

M_2 = Secondary mass of steam

Equation II

$$KE\ (const) = M_1 \frac{V_1^2}{2gc} = M_2 \frac{V_2^2}{2gc}$$

If X = Mass ratio

Then $M_2 = XM_1$

And $$M_1 \frac{V_1^2}{2gc} = XM_1 \frac{V_2^2}{2gc}$$

Then $$X = \frac{V_1^2}{V_2^2}$$

For $V_2 = 0.5V_1$

Then $$X = \frac{V_1^2}{(0.5V_1)^2} = 4$$

i.e., we have to accelerate three times the mass of primary steam to halve the velocity.

Now let us analyse a four-stage velocity compounding situation to see what speed reduction can be achieved.

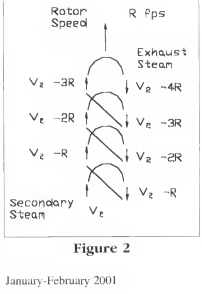


Figure 2

Figure 2 shows the steam flow through a simple impulse turbine rotor using four stages of velocity compounding. The steam enters the rotor with the velocity V_2 and leaves with the velocity V_2 - 4R

At full load the exhaust steam velocity relative the rotor speed should be zero. This situation transfers the maximum amount of energy from the steam to the rotor — i.e. there is no residual kinetic energy left in the steam.

Therefore:

$$V_2 - 4R = R \text{ and } R = \frac{V_2}{5}$$

That is the rotor peripheral velocity is 20% of the secondary jet (V_2) velocity.

The method of getting the exhaust steam from the right hand side of the rotor to the left hand side for re-entry is quite simple and will be revealed during a future construction design article.

Now how can the above theory be applied to model steam turbine design. Let us examine two possibilities.

Consider firstly a single rotor turbine with a 3" diameter rotor and just one simple expansion of the steam form a moderate pressure of 60 psig:

Primary jet velocity V_1	2450 fps (Table 1)
Rotor peripheral velocity R	1225 fps (50% V_1)
Rotor speed (full load)	93580 revs/min

Definitely unmanageable!

Now consider a similar turbine with mass compounding followed by four stages of velocity compounding:

Primary jet velocity V_1	2450 fps (Table 1)
Secondary jet velocity V_2	1225 fps (50% V_1)
Rotor peripheral velocity R	245 fps (20% V_2)
(allowing for four stages of velocity compounding)	
Rotor speed at full load.	18700 revs/min

This is a much more manageable speed. Indeed if we needed even a comparatively low speed of say 1000 revs/min a compact gear box would allow this. If we could find a one tooth pinion we could effect this reduction with one 19 tooth gear (no compounding). Yes we do have a one tooth pinion it is named a single start worm.

In reality of course the steam jet is slowed by friction, turbulence, eddy losses, etc. The heat generated by these losses appears as reheat in the steam. If expansion of the primary steam was from a dry saturated condition then after exhausting from the turbine the steam will not be as wet with droplets of condensation as theory would predict. If on the other hand, the primary steam was superheated then the exhaust steam will be drier or have more residual superheat than theory would predict.

To correct this situation we have a choice from a number of alternatives.

(1) We can accept the lower steam jet velocity and of course, the reduced steam mass flow that must accompany it. This will result in a slower turbine speed and lower power output.

(2) We can increase the size of the nozzle to restore the original mass flow but at the lower steam velocity. This will result in a slower turbine with some recovery of the lost power output associated with (1).

(3) We increase the primary steam pressure to offset the losses. This will maintain the designed turbine speed and power output.

The choice will depend on the circumstances of the application.

Now what to do with all of this? Well one possibility would be to design and build a prototype turbine for testing and development and apply it to model steam locomotive of the 5" or 7¼" gauge passenger hauling size. To recreate a model of the famous Stanier designed Princess class Pacific No 6202, steam turbine driven locomotive would to my knowledge be unique and what a challenge to our model loco engineering enthusiasts.

Newsdesk *(continued from page 45)*

Every week I receive several requests for information on products, equipment and other matters which have nothing to do with the production of the magazine. Sometimes these take several weeks to answer as I usually put them to one side until I have a break between compiling magazines. Magazine production always has to be the top priority (each magazine takes about 5 weeks), so please bear with me if it takes time. ... dp.

Locomotive Trailer Reversing Aid

Story and photos by Dave Giles

Enclosed are a couple of photos of the folding alloy device that I have found invaluable for backing my tandem axle Shay trailer up to an unloading dock single handed.

I have found that this device virtually eliminates the hassle of backing up 'blind' to an unloading dock. It also eliminates the need to take notice of several unknown well-meaning 'helpers' who tell you right when they mean left and tell you to stop after the transfer bridge rail has scratched and dented your loco.

To unload the tender/fuel car (**photo 1**) — firstly the device is unfolded and lined up with the unloading dock rail centreline. The trailer is then reversed back using the long arm as a guide to line up and run the trailer tyres close and parallel to. This guide means that the trailer is then parallel and in line with the unloading track. When the front trailer wheel is in line with the end of the guide bar the distance is very close for my 1 metre long transfer bridge rail (**photo 2 and 3**) to fit. Usually it takes only a small movement forward or backwards to get the distance exact.

Secondly, the alloy reversing aid is moved over to the next trailer rail 'pitch' and the process repeated to unload the Shay locomotive (**Photo 4**).

The measurements for the guide are taken from the rail centrelines in the trailer to the outside edge of the trailer tyre. The material I used is 30 x 5 alloy flat bar.

I used 6 mm x 16 mm lg stainless steel bolts with Nyloc® 0174 nuts in the 6 joints. These are not fully tightened so as to allow the device to be folded and stored along the centre of the track in the trailer when travelling.

I hope that this simple device makes the start of a day live steaming more enjoyable by reducing the frustration factor which can happen when unloading equipment.

I have found it to be great. Since making the trailer reversing aid I have unloaded my equipment with ease 10 times at six different tracks in the past 3 months.

The Shay has covered 320 km in that time also.

(Since this article was written in February last, Dave and his Shay with trailer have clocked up a lot more kilometres and runs, including the tour of North America currently being related by Murray Lane in this magazine ... Ed..)

Photo 1

Photo 2

(without transfer bridge in place)

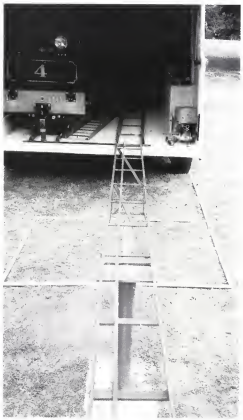


Photo 3

(with transfer bridge in place)

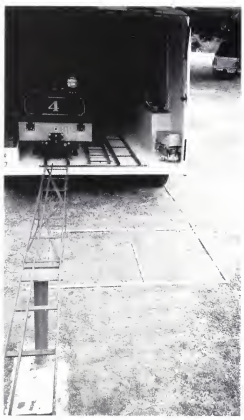


Photo 4

Steam Without Boilers

by Cyril Cannell

Photos by Ted Jolliffe

Many members of the live steam hobby are only vaguely aware that there is an alternative to the conventional locomotive type boiler system for producing high pressure steam. Commonly called 'Flash Steam' or to be more correct, Monotube Steam Generators (MSGs for short). The system has been in existence since the early days of the steam era.

With a very few notable exceptions the system has been largely used in applications where demand was fairly constant, such as in tethered hydroplanes. In recent years in this field these boats have been brought to extremely high speeds, reaching over 120 mph. I still recall with great pleasure, as a schoolboy in the 1930's, my visits to Victoria Park, Hackney in East London to watch the tethered hydroplanes racing round the pole. I was always most impressed by the steamers. Several times during these visits the generating coils (at that time wound from copper tubing) would succumb to high pressure and the intense heat from the ferocious petrol blowlamp, used as a heat source, producing a loud puff and a very rapid escape of steam. So far as I recall no-one was ever injured in these mishaps. There was very little water in the coil — once this had flashed off the commotion ceased.

How flash steam works

The basic principle of MSGs is very simple, water is forced into one end of a tube from which, if the tube is heated sufficiently steam will emerge at the other end. Older readers may recall the gas fired 'instant' water heaters or geysers which were once a feature of many a home. They were often perched perilously over the kitchen sink or the bathtub. Turning on the hot water tap also opened the gas burner valve and a minor explosion, expressed as a 'whoosh' was heard as the gas jets ignited from the pilot light. For many years these quite simple virtually 'flash steam' water heaters were very popular as providers of one of the household's basic amenities.

On starting, the hand pump is operated, forcing water through the control valve **A** into the MSG (see **figure 1**) as shown by the arrow. The engine starts and feedwater is then delivered by the axle pump. **P**. The capacity of the feedwater pump is calculated to deliver the maximum amount of water the MSG will require at maximum demand cycles, i.e. on starting or on a long uphill climb. Thus with the feedwater set at maximum delivery, one should still get best performance from the machine. For lighter duty periods the bypass is opened to regulate the feedwater supply, surplus water being returned to the tank. When coming to rest the control valve is fully opened cutting off the water supply to the MSG and reducing the pressure to zero.

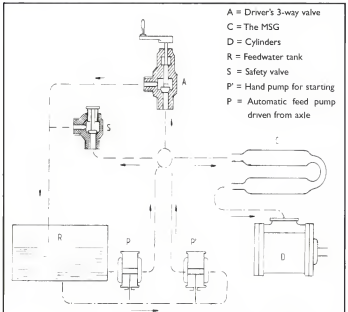


Figure 1 — The control system used by Serpollet on his steam trams.

In the industrial and marine fields MSGs are relatively commonplace even today and can be obtained as complete packages to deliver steam virtually at the touch of a button. In these units, the volume of water pumped into the tubes or generating elements is precisely balanced against the amount of heat provided by gas or oil burners using very sensitive controls to provide the amount and temperature of steam required.

The drawback of this type of installation is that solid fuel cannot normally be used, the heat output from this type of fuel cannot be regulated as exactly, or as quickly as is required for this type of installation. Even domestic central heating units are now turning over to this type of MSG although still supplying pumped hot water rather than steam to the domestic radiators.

The above systems work very well and economically in fixed installations where the demand for steam or hot water is reasonably constant. It is fair to say that not too many live steam enthusiasts would welcome a boiler with fixed output and fuelled by other than the traditional methods.

Historically some of the early pioneers in boiler manufacture partially overcame this problem by drilling or coring passageways in heavy masses of solid metal, the latter provided a heat reservoir to offset the fluctuations in output produced by manual firing and variations in the quality of the solid fuel. It is on record that a steamship using a quite crude MSG of this type successfully sailed to America and back during the 19th century.

The Serpollet System

One of the greatest steam pioneers, a Frenchman, Leon Serpollet, who once held the land speed record with a steam car (60 mph in 1899), developed a novel and extremely successful system which was for many years incorporated into steam trams and railcars, operating in Europe from December 1893 and into the early part of the twentieth century. They were fired with coke, doubtless to reduce smoke nuisance, but also at that time it was a cheap and plentiful fuel.

Full details of Serpollet's trams were kindly supplied to me by a Paris Museum. The MSGs with which they were fitted were surprisingly small, being housed in rectangular casings only 1.7m long by 0.9m wide and 1.26m high. They were located on the front platform behind the driver. The control pedestal was fitted with a regulating by-pass valve and a hand pump for injecting water into the MSG for starting. The twin cylinder double acting engine drove the wheels through 2:5:1 reduction gearing and the unit was sufficiently powerful to haul one or two trailer cars according to traffic demands. A safety valve was incorporated into the system set to operate at 364 psi., the maximum pressure allowed for the type of engine used. The cylinders used were of 0.160m bore and 0.150m stroke, and to maintain a road speed of 12 kilometres/hour the engine revolved at 195 rpm. Various types of engine configurations were used according to the service required, but on a typical network the output of the plant was rated at 109hp/hour, according to the French system then in use.

The trams were double decked, with a capacity of 50 inside, 24 on top and 6 on the platform, and ran on a track of 1.44m. The vehicles were 8m long and carried on 2 axles 1.9m apart.

This type of tram was in common use by La Compaignie des Tramways Nord de Paris. From the general description given it

appears that some vehicles had a chain connecting the two axles, while it appears that others ran with only a driven axle.

Model engineering applications

As regards model engineering, mention has already been made of the flash steam tethered hydroplanes, which are still popular in that branch of the hobby. So far as locomotives are concerned, for two or three decades a few were built fitted with MSGs these were described in earlier issues of *Model Engineer*.

LBSC wrote about a flash steam 2½" gauge Sentinel type locomotive in the 13 July 1933 issue. The builder was F Rogers and the engine which was coal fired was fitted with an ingenious thermostatic dumper to regulate the heat output. Other descriptions were given by 'Uncle Jim' Crebbin (at that time managing director of Carsons) LBSC and other authors. For a short time both the Carsons and Bossett-Lowke concerns manufactured locomotives fitted with MSGs but in the main these were spirit or Primus burner fired. There were a few coal fired types, and for those interested they were well covered in books, such as *Flash Steam* by Edgar Westbury and *Experimental Flash Steam* by J.H. Benson and A.A. Raymond. More recently a French enthusiast, Pierre Bender has built a flash steam gas fired turbine locomotive for 5" gauge and has operated it very successfully.

MSG's the way forward?

The case for using MSGs today for solid fuel fired locomotives from quite small gauges up to and including full-size and also for traction engines and other types having locomotive type boilers is very compelling.

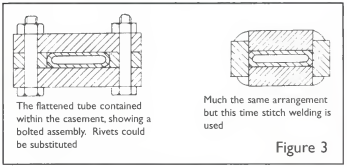
MSGs have been regarded as inherently safe from the very beginning, but not currently being classed as 'pressure vessels' they attract only minimal insurance and inspection routines. The water capacity of a MSG is tiny compared to that of a conventional boiler, which should give this type an edge in any boiler regulations, where the inspection regime is based on the bar/litre capacity of the steam generator.

Figure 2

Bearing this in mind considerable development work has been undertaken which has evolved into a very simple and easily built system for MSGs which need not detract from the external appearance of any model or full-size vehicle. Low cost, readily available materials are used and financial savings as compared to conventional boilers can be very substantial.

Considering the low cost of construction compared to the very high costs associated with even quite modest conventional boilers, and related to the high costs incurred in developing the system, we were advised that the system should be patented. Patents have now been granted for the UK and other countries. As to the patent itself, like all good ideas it is very simple, in fact almost deceptively so, and only concerns the construction of the actual generating elements.

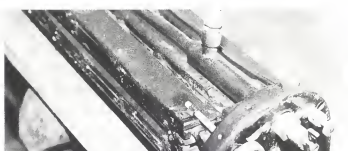
Using black mild steel bar for the encasements and copper or stainless steel tube for the water/steam ways, the total cost for a MSG using this system is fractional compared with that of constructing a conventional boiler. To take an example, materials for an MSG to fit into a 3½" gauge *Maisie* 4-4-2 locomotive using 25 x 6mm encasements and ordinary 15mm domestic plumbing copper tube which is capable of withstanding quite high pressures worked out at less than $30. Once the unit was assembled on hydraulic test a pressure of 900 psi was sustained. When making a replacement boiler it is assumed that the original shell will be re-used only the MSG elements will be new.


The flattened tube contained within the casement, showing a bolted assembly. Rivets could be substituted

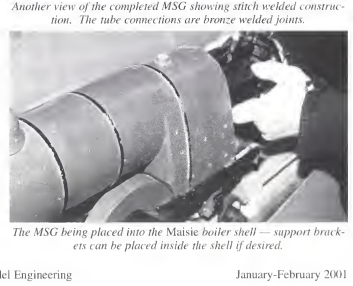
Much the same arrangement but this time stitch welding is used

Figure 3

Small dial type pyrometers are used to monitor working temperature. Due to the lighter construction vast quantities of heat are not required to join the elements of the MSG although the use of oxy-acetylene equipment is useful to bronze weld the element


The MSG unit ready for installation in the Maisie. *Note the dial pyrometer passing through the backhead and screwed to the encasement to record actual temperatures within the boiler shell.*


Another view of the completed MSG showing stitch welded construction. The tube connections are bronze welded joints.


The MSG being placed into the Maisie *boiler shell — support brackets can be placed inside the shell if desired.*

connections. Silver-soldering can be used here, but bronze welding is preferred especially in the larger model gauges. As shown in **figure 3** the encasements can be stitch welded rivetted or bolted together.

Full size operators would doubtlessly make use of commercial steam fittings to facilitate maintenance. Serpollet used this system in his MSGs. When the MSG is finally assembled and ready for installation great care needs to be taken to shield those connections and any other parts of the internal tube from direct exposure to radiant furnace heat. They should be protected by the encasements.

The cross sectional area of the water/steam passages may be chosen according to the degree that the tube is partially flattened and may be varied from the water inlet to the steam outlets, Internal pressure ensures excellent contact for the transfer of heat from the encasements. The latter not only protect the tube, but can provide whatever degree of heat reservoir which is required.

It is accepted that when initially pressurised the monotubes may move slightly to conform more closely to the shape of the internals of the encasements. This is no disadvantage, it makes for more effective heat transfer from the encasement elements to the MSG proper. A further advantage of the system is that the outer shell of the boiler now becomes only a casing to contain and act as a passage for the products of combustion to reach the smoke box and chimney. The only pressurised elements in the MSG are the water tube and to a lesser extent the encasements.

Preheated combustion air

On larger installations Serpollet employed double skinned casings, air to the furnace being ducted between them so providing pre-heating as an aid to efficiency together with excellent insulation. If this method is not used an insulating material such as Kaowool or similar should be installed. For the replacement of existing boilers in full-size the existing boiler shell can be retained with the inner firebox, tubes and tube plate removed. This affords a considerable saving in cost and retains the original appearance. Apart from locomotives these benefits apply particularly to traction engines and other similar installations. The front end draughting is virtually as normal but without the gas flow problems associated with normal fire tube boilers. The furnace may be conventionally located but should be surrounded by a metal frame substantially line with refractory material to protect the adjacent frame structure and outer shell.

Water feed by axle or crankshaft pump should be as even and pulseless as possible certainly at least a twin or double acting unit. A small handpump is required for starting unless a feed tank, pressurised by air, is preferred although provision of this type of auxiliary system may involve testing under current or future pressure vessel regulations. There is endless scope for experiment with water feed systems certainly an infinitely variable delivery pump would appear to be almost ideal, perhaps with some for of automatic control. It is not considered practical to use injectors as water feeds for this system.

Start up with engine lubrication

With the relatively large mass of the metal encasements which is a feature of the system and a considerable portion inevitably located away from direct radiant heat, a stabilising effect is thus given to the temperature of the output steam, which can be monitored by a pyrometer, a long probe dial type being ideal and not expensive.

Incoming water supply volume may be varied to check excessive temperatures, any excess steam thus generated being vented back to the water tank via the pressure relief valve. Using an MSG the output pressure can certainly be higher than with a conventional boiler, if so required another factor aiding economy.

Lubrication to cylinders and valves must of course be absolutely reliable if higher steam temperatures are used, as the hopefully self lubricating properties of wet steam will be absent. No superheater is needed, the steam supply can be arranged as hot and dry, or as wet as wished, safety valves can still be arranged to be in their original positions and set to lift at just above relief valve pressure. Although a conventional regulator could be fitted speed regulation is easy by manipulation of the control valve.

It is worth mentioning is that while no doubt the system can be classed as flash steam the patented system in service responds more as would a conventional boiler taking time to raise the temperature of the encasements before starting. On the question of 'mortgaging' the system while no vast amount of stored heat would be available from the encasements, when extra demands are made on the engine the volume of extra water that has to be heated is minute compared with the capacity of a conventional unit. To date there has not been opportunity to put this feature to practical test, but no doubt builders of MSG powered models would report on their experiences. There is a case here for the driver to exercise his skills and anticipation to ensure that the MSG delivers optimum performance in service.

Licensing

It was originally intended that only commercial builders for full-size applications would be required to obtain licences to utilise the patent. However since many models are produced commercially, or with eventual sale in mind, regretfully this requirement has now had to be extended to even the smaller size models. The licence is to use the patent for a one off boiler and all licenses will be registered by the patent holders and suitable documentation provided. A metal licence plate bearing an individual registration number will be provided to affix to the vehicle as proof of license. Franchises can be made available for commercial boiler makers who wish to take advantage of building MSG's using this system.

Remember that even after paying the license fee the costs of building or installing this system to any steam vehicle is fractional compared to the cost of a conventional fire tube boiler, but to keep within legal requirements, a licence to manufacture is a must for prospective builders.

Under current patent law the builder or owner of an article incorporating a patent for which a licence has not been obtained may not sell it or even offer it for sale. To do so would be an infringement of the patent and render the offender liable to prosecution and legal penalties.

Scale of licence charges

At the time of publishing the licence costs were as follows:

Locomotives up to and including small 5" gauge	£30
Large 5" and small 7¼" gauge	£50
Large 7¼" and small 10¼"	£100
Large 10¼" and all 15" gauge	£250
Traction engines to 3" scale	£30
Traction engines to 6" scale	£50
Full size traction engines	£150
Steam boats up to 25' L.O.A.	£150
Steam boats over 25' L.O.A.	£350

Full size locomotives 15% of conventional boiler cost minimum £1000

Anyone requiring further information can contact Safer Steam Systems (see ad. in Classifieds on page 64) or their Australian Agent :-

Dave Crainger, P.O. Box 197, Ferntree Gully, 3156
Phone (03)9758-4201

Handy Hint

A torch for silver brazing

You require the oxy bottle and cutting torch, LP gas tip fitted. An LP gas bottle takes the place of the acetylene bottle, an adapter is required to connect the acetylene hose to the LP gas cylinder. (Cost about $7, LP gas tip $10).

The set up is very good for silver brazing, bronze welding, heating and MS cutting, but no good for MS welding.

Ed Murrell

Letter Box

What is this engine?

Sir,

The enclosed photos (below) are of an antique model engine, which I was asked to identify and price. The person who brought it to me found it in the garage, after living there for 14 years! I can't identify it but thought that maybe an *AME* reader can.

The plaque reads:

MODEL ENGINE
BY
JAMES FARRER
1866 YORKSHIRE

The engine is very well made, and stands about 12" tall. It has a very rusted crankshaft-three throw. The central crank connects to the piston rod, whilst the two outer, diametrically opposed, cranks connect to a sort of sleeve surrounding the central piston rod. The valve has one eccentric only, and covers the full length of the cylinder. It has a transfer passage the full length, with ports connecting both ends to a central belt around the cylinder.

It's certainly a table engine of some kind, maybe a compound with contra piston.

Dave Merrifield
Windang NSW

Help with *Ayesha*

Sir,

I would like to thank all who responded to my request in the Sept/Oct issue of AME for their assistance in obtaining the "words and music" to build LBSC's *Ayesha*. To Russell, Gerry (UK), John (USA), John, Lee, Hugh and Brian, thankyou.

Peter Lukey
Babinda Qld

IBLS open invitation

Sir,

I was thrilled to participate in the IBLS meet and ramble that was held along the west coast of North America starting at Burnaby, British Columbia and ending in Southern California. It was truly an experience meeting all the modellers from around the world.

There was one disturbing quote that I heard from a number of people who were present on the ramble — "*IBLS membership is only open by invitation*". The IBLS has always been open to anyone with an interest in live steam.

Quoting from an e-mail letter sent to me by my good friend Keith Taylor, IBLS East Coast Secretary —

"Hi Dennis, Please consider this as an invitation to all who wish to join the IBLS as having been officially invited! Membership is open to absolutely everyone! Just contact the secretary nearest to you and you are in! Any one who tells you different is misinformed. The only requirement is a genuine interest in Live Steaming and the study thereof. That's it, there is no other requirement and no charge to belong. A return envelope with postage would be appreciated by the secretaries, but is not mandatory. Hope this clears up this matter. Sincerely, Keith Taylor Secretary - East Coast USA IBLS."

Sometimes it is hard to find out who starts and perpetrates this sort of rubbish but if all our hobby publications publish the correct details maybe the rumour will die a natural death. If anyone would like a copy of the application and the address of their nearest IBLS regional secretary please go to the following web site on the world wide web and print off a copy. http://www.loganact.com/modeleng/ibls.htm is hosted for free as a public service by Scott Logan of Logan actuators in Chicago.

Dennis Dalla-Vicenza
Victoria, BC Canada

IC help needed

Sir

I am currently looking for information regarding modern scale internal combustion engines, ideally V8, V12 or similar and have had absolutely no luck anywhere. I am also looking information concerning forced induction techniques (turbo charging, super charging), design and construction.

This information is required to complete a project that has been a long time in coming and your magazine has come highly recommended as source of very helpful information.

I am willing to meet any costs involved in the gathering such information and would be extremely grateful if you or one of your readers could point me in the right direction.

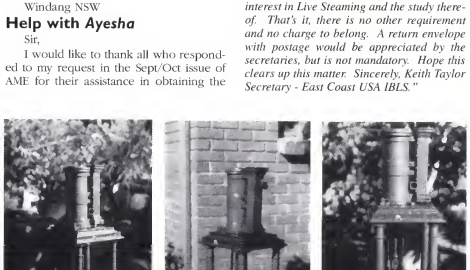
Craig White
Unit 15/65 Trafalgar Street
Stanmore, NSW 2048
Ph (02) 9519 3092 Mob 0411 050 427

Invitation run appreciation

Sir,

Through your column I would like to express my gratitude to all those people whose efforts made the September 2000 Invitation Weekend at Canberra so enjoyable for the visitors. The numbers may have been down but this allowed those present more enjoyable running. Thank you Kingston from the WDLS mob.

Neil Matherson
Yagoona NSW



Can you help Dave Merrifield identify this engine? If so, please advise the AME office

Letterbox Contributions

You are welcome to send letters by mail to:

PO Box 21, Higgins, ACT, 2615 or
fax to: (02) 6254 1641 or
e-mail to: **amemag@bigpond.com**

As far as possible, AME is an open forum for all members of our hobby. Therefore, all expressions of fact or opinion as long as they are not libellous will be considered for publication.

Please **type or clearly print** your letters, as script is often difficult to interpret. Due to popularity of *Letter Box* and the limited space available, letters of **400 words or less** will have a better chance of being published.

Etched Brass Name Plates

By Doug Mellor

Photos by David Proctor

Further to the article in AME issue 89 by Bruce Allen in regard to photo etched brass nameplates, I have another couple of methods that can provide excellent results without having to obtain special ultraviolet resist chemicals, provide reverse transparencies etc. I have used my favoured method a couple of times to produce nameplates. The basic method is as follows:

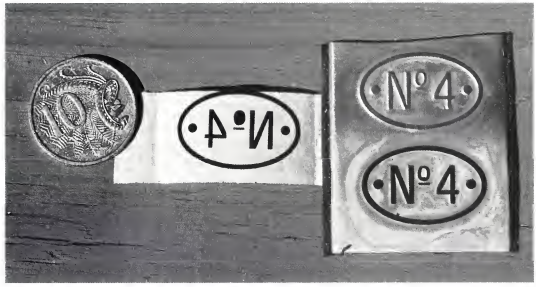
Obtain either Letraset ® or 'vinyl cut' letters from a news agent, stationary distributor or signwriter (as detailed later).

Clean the brass much as described Bruce Allen. Place the letters on the brass sheet in the appropriate pattern. For vinyl cut letters, these are self adhesive and present no difficulty. For letraset letters, the letters must be applied by "rubbing" onto the brass using a pencil, or other device. these days, it is also possible to obtain vinyl cut letters already laid out in the pattern that you select by various commercial sign writers. Borders and other features can also be included in the vinyl cut provided by the sign writer. These letters come with the background peeled off (i.e. the space between the letters), and a piece of masking tape holding the letters in place on the backing tape. It is a simple matter to peel off the backing tape, and place the letters onto the brass sheet (the masking tape maintains the alignment of the letters during this process). The masking tape can then be carefully peeled off leaving the plates ready for etching.

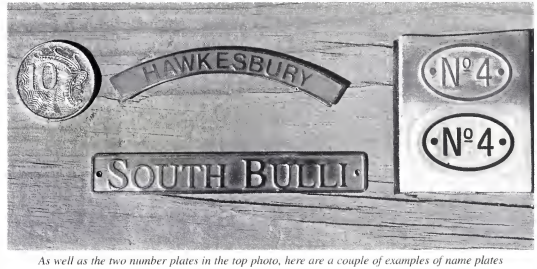
The etching process then follows the same procedure described by Bruce.

Again, if thin letters are used, or letters with serifs etc, then care needs to be exercised to prevent undercutting of the mask and destruction of the letters. I have etched plates to approx 0.008" depth without problems using this procedure.

The other method that I have used successfully (although with a degree of difficulty, and not as neatly as Bruce), involves the use of an ink pen filled with a solution of shellac and methylated spirits. The ink pen is used to produce the design, and the shellac acts as the mask. Again, etching takes place in the usual manner.



These two number plates have been etched using the resist shown on the white backing tape. The 10 cent coin is used to give an idea of the size of the plates and no, it was not etched!



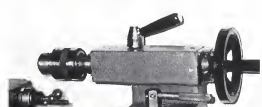
As well as the two number plates in the top photo, here are a couple of examples of name plates

An Easy Tailstock Lock

I am sure there must be a lot of these reasonably priced fairly accurate little AL20 Chinese lathes. I find them excellent for turning small pins, unions, check valves, steam valves, etc.

The one big drawback was the tailstock locking system being a big M12 x 1.5mm hex nut and a spanner kindly provided. Only trouble is this spanner had the habit of hiding amongst the files and tools on the lathe tray. I could never find it when needed.

The solution to the problem I found when looking through a 1930's English *Model Engineer* magazine. As can be seen in the photo, I used a bit of 3/4" BM steel x 1" long. Drill and tap 12mm x 1.5 thread to suit the bolt and drill and tap six holes 5/16"W around the top. Make a tommy bar 3 1/4" long, knurl the end and presto, 1/5 of a turn will lock the tail stock. You will never have to look for the spanner again.



Les Banhidi

Under 25s Encouragement Award

2001 Entry Form

Name ..... Age .....

Address .....

..... Phone .....

Club or Society (if applicable) .....

Qualifications and/or occupation .....

.....

Brief description of entry .....

.....

.....

Approx. dimensions & weight ..... (Enclose photo if possible)

Equipment used in construction (e.g. lathe, drill press, hand tools, etc.) .....

.....

.....

Other information relating to the entry (eg. outline of construction and assistance had, if any).....

.....

.....

.....

Australian Model Engineering undertakes that the privacy of entrants will be respected.

I hereby declare that:

1. I have personally constructed at least 75% of my entry.
2. I was under 25 years of age as at 31st December 2000.
3. I agree to the conditions of entry and that the judges decision will be final.
4. I agree to display the entry at the 2001 AALS Convention site for the purposes of judging.

Signature ..... Date .....

The AME Under 25s Encouragement Award

Conditions of Entry

Younger model engineers are making great contribution to the hobby, even though they are often hampered by having less access to tools and resources than older model engineers. AME instigated this award in 1993 to encourage under 25s to show their talents; to engender a spirit of encouragement in more experienced model engineers; and in a small way to foster the growth of participation by people in the younger age range.

We've been pleased to hear that a number of under-25s have been spurred on to complete their models by the thought of participating in the award.

If you fit the age criteria, photocopy the entry form on the next page, post or fax it to AME and start a-fittin' and a-turnin'!

Age criteria

If you turn 25 in the 2001 calendar year or later, you are eligible. If you turned 25 in the 2000 calendar year or earlier you are not eligible.

Entries

May be any model or experimental engineering item or model. For example it can be a steam, diesel or electric outline locomotive; steam, internal combustion, electric, hot air and Stirling cycle, stationary or mobile plant or road vehicles; boats or ships with any form of power drive; marine plant; workshop equipment, jigs, fixtures and aids to manufacture; clocks and other horological or astronomical items; electronic, programmable logic, digital and analogue controls and monitoring of any of the above models — or any other item(s) which the judges consider relevant to model engineering.

Judging

The following points are taken into consideration:

- The age of the entrant and skills relevant to age.
- The ambitiousness of the project.
- The workmanship of the project.
- The access to workshop facilities.
- The location to resources & materials.
- The formal skills of the entrant.

The above is intended to even out the playing field so that the judges may look at each entry on an "all things considered" basis. The idea is that the thirteen year old student (with no formal mechanical skills) from the Back'O'Bourke who works in a tin shed with pistol drill, hacksaw, file and hand scraper to build a model of a ferris wheel has as much chance as the 25-year-old qualified thou-splitting toolmaker with a CNC workshop and limitless resources who has turned out a VR H class 4-8-4 with working stoker engine!

Have a go!

The presentation will take place at the AALS Convention at the Penfield Model Engineers grounds in South Australia this coming Easter. Entries will be received up to day one of the convention. The perpetual trophy will be awarded at the AALS presentation night on Sunday evening. A prize (to keep) relevant to the winner's interest in the hobby will also be presented.

So come on all you younger model engineers, let's see the tables with plenty of entries on them in Adelaide this Easter!

-30-

Classifieds

71/4" g. 2-8-0 locomotive *POEM* for sale

- As described in Oct/Nov issue of AME. Engine and tender with passenger car as pictured on page 19. NZ$28,000. Contact Murray Lane. Ph/fax (64) 9 534 8396

Model machining services

- Examples: lathe, milling, tapping, boring. Castings done to your drawings. Tool sharpening e.g. drills. Supplier of materials. For further details write, fax phone Stephen Palmer, P O Box 95, Windsor NSW 2756. Ph. (02)4574 0153, Fax (02)4571 3270.

Scale Steam Locomotives & Rolling Stock (reg.)

- Specializing in Victorian Railways Steam Locomotives, Rolling Stock and Accessories in 5-inch gauge. Currently under construction, or presently available, are Z and ZL Goods Vans, GY's, I and IY's, S and Q Flat Top Bogied wagons, E Steel Bogied Gondolas, K Flat Top wagons, T Goods wagons, Oil and Acid type tankers and P Explosive wagons (others hopefully to be produced soon). All wagons are complete and ready-to-run with individual coding and numbering, auto couplings and air hoses and finished painted in any of the colour schemes used by the Victorian Railways. Now under construction are two (2) Victorian Railways N class 2-8-2 type locomotives in 5-inch gauge, and both will be offered for sale as ready-to-run. For further inquires on our products, or if you would like a copy of our complementary Catalogue, please contact Erik or Dennis at our address by mail, phone, fax or e-mail us at Scale Steam Locomotives & Rolling Stock (reg.) PO Box 492, Daylesford, 3460, Victoria, ph/fax: (03) 5348 4135, e-mail: steamers@netconnect.com.au

5" gauge loco for sale

- Brand new 10 class 2-8-2 tank loco with hopper truck and brake van. Certified copper boiler. Details: Tony (02) 6722 4460 or www.users.bigpond.com/windyhills

5" gauge 0-6-0 loco for sale

- Based on the *Blowfly* but 1¼" dia. Cylinders and outside frames. Copper *Blowfly* boiler with current AMBSC cert. Injector and axle pump. Great condition. $2500. Ph. Greg (02) 4951 1330 or 0414297790

3½" gauge C38 loco for sale

- Needs minor assembly. Copper boiler $3600. Ph. Stephen (02) 9825 1170

Steam without boilers

- Low cost materials, easily built, inherently safe, models and full size. Information, advice and patent licences from: Safer Steam Systems (IOM) Ltd, Peel, Isle of Man. UK. Fax 0015 44 1624 842858

7¼" diesel hydraulic loco for sale

- Dash 8 — Santa Fe style, this would be a fantastic club loco powered by a 13hp Kubota diesel. Driving Danfos hydraulics, it is very strong and reliable loco and only a few months old since completion. Located at Castledare Railway, Perth WA. $18,000 ono. Ph. Paul (08) 9398 1175

7¼" gauge *Jessie* for sale

- 0-4-0 saddle tank loco. Plans, rolling chassis, cylinders and other castings unmachined. No boiler or boiler parts. $500 ono. Ph. (02) 6351 3020

For sale — 5" gauge

- *Nigel Gresley* 2/3rds built 2-8-0 locomotive frame and tender. All plans to go with frame, plans incl. Two different boiler drawings
- 2nd series T-class (VR) (riding only)
- Full set of W-cars such as AW, BW, ABW, CW and parcel van
- Car carrier with three Chev cars to scale
- Two GY wagons
- One QR wagon
- Plans for first series T-class loco
- Gen arrangement for 2nd series T-class
- Plans for G-class loco
- Sale price for all is $14,000. Open to good offers, must sell, please help. Contact Warren Taylor (03) 5784 1076 (Broadford)

Model Engineer — 383 copies

- Early 1983 to March, 2000. Make an offer. Ph. (02) 6545 1414

5" gauge *Simplex* for sale

- 3 years old with little use, current boiler certificate, built by Bob Kimber. Asking price $5000. Phone Peter or Corey (07) 4123 5603 email: peterp@mary.big.net.au

Lathe for sale

- Australian made by Purnell Eng. No 206. 110cm b/c, step bed 25cm to centre line, 15cm over bed. Face plate 30cm dia, 3-jaw and 4-jaw chucks, 2" hollow spindle, back geared. 2 x 1hp motors — 1 x 240v, 1 x 415v. Located Brayton, nr. Marulan NSW. John (02) 6281 0028

For sale — incomplete 7¼" gauge AN loco

- Incl. Bogies with 6" wheels, chassis (12' long, 22" wide) 186 Holden motor, 200 amp generator, 2 x C45 generators as motors on bogies, air brakes all round. Some body work done. Incl. Plans $4000 ono. Ph (08) 8522 5468

7¼" gauge Baldwin 0-4-0 industrial loco for sale

- *Sandfly* as featured in AME Sept-Oct 1993 and Jan-Feb 1998, plus 6 ft driving truck and accessories. $4,000 ono. Contact Graham (08) 8265 2853

Subscribers' Free Market

FOR SALE

2 **ride-on 5"g carriages** 6ft long, unbraked bogies, cushioned seats. $300 each ono John (02) 4751 1360

Complete set **castings for 5"** *Springbok* plus full set (12) drawings. Cylinders and wheels machined. $350. Ph. Cameron (03) 9729 4417

Sandberg pumps for sale, 1⅛" scale, 2 off brand new $500 each. Ross Bishop 0417 437 169 fax (02) 9820 1152

WANTED

Plans cabin coal tender for Kozo Hiraoka's 3½" Heisler, *Live Steam* 1979. Harry 0503 51 459 or 1 Excelsior St, Manangatang Vic 3546

Metal shaper, smallish, hand or powered. Any condition. Contact Michael (08) 9752 3573 or 25 Blue Crescent, Busselton WA 6280

Milling attachment and faceplate suit Hercus model A 9" swing

Classified rates

- $3.50 per line as published (including heading).
- Don't send payment with ad, we'll invoice you after publication. No limit to the number of words.

Subscribers Free Market conditions

- Non-commercial only, at the publisher's discretion.
- Maximum of twenty words, including your contact name, phone number or address.
- Posted, on special form provided. No faxes please.
- 5" gauge or larger locomotives (for sale) are not eligible.
- Only one entry per issue.

AME Retail

BOOKS

38	$72.00
50 Years of the Sydney Live Steam Loco Society	$12.50
Among Their Favourites	$48.50
Australian Steam Locomotives 1896-1958	$72.00
Australia's Last Giants of Steam, David Burke,	$55.00
Away with Steam	$28.00
Bridges Down Under (soft cover)	$44.00
Byways of Steam - 7	$31.00
Byways of Steam - 9	$31.00
Byways of Steam - 10	$34.00
Byways of Steam - 11	$37.50
Byways of Steam - 12	$37.50
Byways of Steam - 13	$42.00
Byways of Steam - 14	$37.50
Byways of Steam - 15	$38.50
Byways of Steam - 16	$42.00
Byways of Steam - Encore	$38.50
Coaching Stock of the NSW Railways Vol.1	$105.00
Early Diesel and Elec. Locos of the NSWGR	$55.50
Four Decades of Railway Photography**	$37.00
Green Diesels - 40 and 41 classes (NSW)	$55.50
Man of Steam - E.E. Lucy. (ONE LEFT!)	$40.00
Motive Power - Dev. of Modern Aust. Locos	$46.00
Rail Scene NSW Vol.12 (soft cover)	$43.00
Rails to Wealth - The Silverton Tramway	$53.00
Shimmer of Steel (book only)	$76.00
Steam in the Sixties	$39.00
The 34 & 35 classes	$55.50
The 57s and 58s (3-cylinder power on NSWGR)	$61.00
The 60 class	$50.00
The Blowfly Manual	$55.00
Tracks in Time	$44.00

*Book titles above marked ** are at a special price*

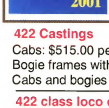
The 2001 CALENDAR

It's big! 26 colour photos

It's broad! Australia-wide coverage

The 2001 calendar is in the regular double-sided format, twice the value, with 13 steam and 13 diesel colour photos, from over four decades of railway photography. Some of Australia's foremost lensmen have contributed to make this an outstanding production.

Steam highlights include 3813 in its prime on the *Central West Express*, T44 on the Hawker goods, a blue DD17 at Manly, V1206 near Collie, Rx229 in the Adelaide parklands, R761 at speed, 3827 on a stock train, J508 on the Goroke line and double-headed AD6O class breasting Fassifern summit.



Diesel highlights include EL57 and EL52 in their spectacular new CECLA livery, three 45s and 2 44s on a freight at Murrurundi, bulldog-nosed CLP13 in the new ASR 'bumble-bee' livery, Tasrail's new image, Silverton's 442s3 doubling Australis 4814, SteelLink-livened NR58, 25kV electric action in Queensland, and uniquely livened 42104.

All this, 26 top-quality colour photos of trains in regular service throughout Australia over a span of 46 years. The new format is 380 x 280mm, spiral bound on top-quality, glossy paper, all for only $16.50 posted within Australia.

422 Castings

Cabs: $515.00 per pair.
Bogie frames with dummy brake cylinders: $394.00 per pair.
Cabs and bogies set $905.00.

422 class loco drawings

$12.95 if purchased singly or $9.95 if two or more in the series are purchased at the same time.

Bettendorf bogie kit

5" gauge (for scale wagons only, not suitable for riding cars).
Kit comprises of two bogies made up of 4 side frames, 2 bolsters, 8 cast wheels, 8 springs and 4 axles. $275 per kit.

Golden Arrow (steam launch) drawings 1:1 scale (1 sheet hull template & 1 sheet boiler) $16.00

Videos

Return of the Giants $41.50
A film, set in South Africa, tells the story of the foundation of the Sandstone Steam Railroad Company (SSRC) that has resumed operations on the former Bethlehem to Bloemfontein branch of South African Railways. The film also has scenes from the same location in its heyday. VHS, PAL, 80 min.

The Great 100 Working $41.50
From the same stable as the film above comes a film of an event to conquer a Guiness world record and to mark the centenary of the Anglo-Boer war. The largest gathering of traction engines in South Africa! 100 machines ploughing the same land at the same time! It also covers a new 2ft gauge line on Sandstone Estate. VHS, PAL, 90 min

Steam Fever $41.50
South African video looking at aspects of mainline work in the final days of steam. Incl. "Red Devil" and Class 25 condensing locomotive.

Superlatives In Steam $41.50
Shows some of the largest steam locomotives in preserved working order on US railways. Incl. Nickel Plate Berkshire 2-8-4 no.765, Norfolk and Western 'J' Class 4-8-4 no.611 and Norfolk and Western 'A' class Mallet no.1218. 1218 footplate and restoration Scenes included.

24 hrs. of Live Steam $20.00
An A M E production showing 5"gauge live steam locomotives in action hauling heavily loaded trains of between one and two tonnes on the Illawarra Live Steamers track at Wollongong. Action includes NSWGR 35, 36, 38, 50 and 59 class locos along with shots of Simplexes, Blowflys and Sweet Peas.

Magic of Steam $41.50
A 40 min. EK video look at East German preserved steam at work in revenue service during 1989.

Milestones in Railway Preservation (Australia) $51.50
Written and directed by Graeme Belbin. Qld's 130 year old A10 No.6, to a Victorian R class leading 3 diesels. 3830 and rare archival scenes — tripple headers out of Lithgow in the 1950s and black 3801's supposed last run. Duration: 90min.

Steam and Diesel Railway Review 1997 ..... $44.50
Covers rail action of WA, SA, Tas, Vic, Qld & NSW. Digitally mastered and professionally narrated.

Steam and Diesel Railway Review 1998-1999 . $46.50

Steam Rails and Sugar Cane $41.50
Features historic footage (1957, 1966 &1968) of Qld's narrow gauge in the sugar growing area. Also QR steam and rail motors.

e-mail direct to AME Retail:
jpoliver@webone.com.au

All prices include GST, postage and packaging Australia wide
Payment by cheque, money order, Bankcard, VISA or MasterCard to:

AME Retail
PO Box 21, Higgins, ACT, 2615
Phone / Fax : (02) 6292 1938
http://www.ameng.com.au

Plough Book Sales

A Century of Classic Tractors by Ian M. Johnston, 87 pages	$29.70
A-Z of British Stationary Engines Volume Two: L-Z, 128 pages	$43.45
Caterpillar Cronicle: History of the World's Greatest Earthmovers	$54.95
Caterpillar Pocket Guide The Track-type Tractors 1925-1957, 96 pages	$35.20
Crawler Tractor Scrapbook Part One by Richard H. Robinson, 160pp	$54.95
Crawler Tractor Scrapbook Part Two by Richard H. Robinson, 160pp	$54.95
A.H. McDonald, Industrial Pioneer, 318 pages	$33.00
A History of Aircraft Piston Engines, 244 pages	$47.30
Diesel's Engine Vol. I, From Conception to 1918, by Cummins, 768pp	$119.90
Engines Afloat From Early Days to D-Day Volume I: The Gasoline Era	$69.85
Engines Afloat From Early Days to D-Day Volume II: Gasoline/Diesel	$69.85
Producer Gas for Motor Vehicles, 194 pages	$28.60
Sparks and Flames Ignition in Engines, 176 pages	$31.90
The Evolution of The Heat Engine by Ivo Kolin, 106 pages	$43.45
The Rotary Aero Engine by Andrew Nahum, 64 pages	$49.50
Guide for the Boiler Attendant's & Engine Driver's Certificate, 269pp	$27.45
Stationary Steam Engines of Gt. Britain Vol 1: Yorkshire, 320 pages SALE	$105.00
Steam Engine Design (1896), 192 pages	$20.90
The Steam Engine in Industry by George Watkins, 128 pages	$30.80
The Textile Mill Engine by George Watkins, 232 pages	$82.50
Tie Hackers to Timber Harvesters, 240 pages	$80.30
Australian Steam Power - The Journal for the Steam Engine Operator	$5.50
Beyer, Peacock locomotive builders to the world, 302 pages	$132.00
Hunslet Narrow Gauge Locomotives by Andrew Neale, 60 pages	$30.80
Light Railway Construction (1897) by E.R. Calthrop, 34 pages	$19.25
Maintenance of Locomotive Boilers by Allan Garraway, 57 pages	$37.40
The Hunslet Engine Works Over a Century and a half of Loco Building	$96.80
507 Mechanical Movements (1893), 122 pages	$16.50
Practical Distiller (1910), 156 pages	$19.80
Secrets of Building a Plastic Injection Molding Machine, 127 pages	$31.90
Windmills & Wind Motors (1910), 78 pages	$15.40
Building Simple Model Steam Engines by Tubal Cain, 107 pages	$16.95
Building Simple Model Steam Engines Book 2 by Tubal Cain, 106pp	$18.95
Building the Atkinson Differential Engine by Gingery, 112 pages SALE	$37.00
Building the Henly 'Junior' Steam Engine, 6 pages	$4.95
Building the Stuart Beam Engine	$20.90
Do It Yourself Vacuum Forming for the hobbyist, 125 pages	$30.25
Gas Engine Construction (1900), 296 pages SALE	$32.00
Gas Turbine Engines for Model Aircraft by Kurt Schreckling, 106pp	$49.50
Machinery for Model Steamers, Boilers and Engines, 45 pages	$14.85
Model Boilermaking Designing Making & Testing by E.L. Pearce	$18.15
Model Engineering, A Foundation Course by Peter Wright, 408pp	$43.95
Model Hit and Miss Engine 1-1/8" bore 1-1/2" Stroke, 41 pages	$26.40
Model Petrol Engine by E.T. Westbury	$38.50
Model Petrol Engines - Design & Construction	$18.15
Model Stationary Engines, Their Design and Construction, 72 pages	$17.05
Model Steam Turbines-How to Design & Build Them by H.H. Harrison	$17.60
So You Want to Build a Live Steam Locomotive, 161 pages	$86.90
Steam & Stirling Engines You Can Build Book 2, 200 pages	$86.90
Steam and Stirling Engines You Can Build by W. C. Fitt, 160 pages	$85.80
The Model Locomotive from Scratch by B. Terry Aspin, 92 pages	$29.95
The Model Steam Locomotive by Martin Evans, 208 pages	$39.95
The Stirling Engine Manual by James Rizzo, 195 pages	$88.00
Twin Cylinder Horizontal Steam Engine plans, 6 pages	$4.95
Design, Construction & Operating Principles of Electromagnets	$17.60
Strictly I.C. magazine (6 issue subscription $59.40)	$13.75
Ignition Coils and Magnetos in Miniature, How to build them	$47.30
High Frequency Induction Heating (1944), 235 pages	$26.40
How to Build a Solar Cell that Really Works, 22 pages	$10.12
How to Run Three Phase Motors on Single Phase Power, 20 pages	$6.33
Secrets of Lead-Acid Batteries, 44 pages	$11.00
Black Powder Manufacture Methods & Techniques, 160 pages	$40.15
Advanced Machine Work (1925 workshop), 800 pages	$66.00
Around Wilf's Workshop The Restorers' Handbook Volume 1, 90 pages	$31.90
Bent Iron Work Including Elementary Art Metal Work, 160 pages	$22.00
Blacksmith Shop & Iron Forging, 96 pages	$16.50
CNC Programming and Machining Fundamentals, 352 pages	$102.30
Decorative & Sculptural Ironwork & Tools, Techniques, 312 pages	$70.40
Elements of Machine Work by Robert H. Smith (1910), 191 pages	$41.80
Forge Craft (1913) by Charles Philip Crowe, 175 pages	$22.00
Foundry Manual (1958 US Navy publication), 300 pages	$44.00
From Forge & Anvil, Erich Riesel Hill Country Iron Worker, 96 pages	$49.50
Gears and Gear Cutting by Ivan Law, WPS No. 17, 136 pages	$18.95
Grinding, Lapping & Honing, 78 pages	$18.15
Hardening, Tempering, Annealing and Forging of Steel, 288 pages	$22.00
How to Build a Forge, 15 pages	$11.00
How to Run a Metal Working Shaper & Drill Press, 48 pages	$15.40
Indexing Tricks (1903 milling machine work), 31 pages	$8.80
Lapping & Polishing by E.K. Hammond	$17.60
Lil Bertha Electric Furnace, 67 pages	$19.80
Machine Shop Methods by Lorus J. Milne, 376 pages	$41.80
Machine Tool Adjustment, 47 pages	$13.20
Machinery Handbook 26th Edition (tool box edition), 2511 pages	$175.55
Melting & Casting Aluminium (1925), 253 pages	$20.35
Milling Machine Practice from Cincinnati Milling Machine Co. 28pp	$8.80
Modern Toolmaking Methods (1915) by Franklin D. Jones, 309 pages	$28.60
New Edge of the Anvil A Resource Book for the Blacksmith, 243pp	$65.45
Plain and Ornamental Forging by Ernst Schwarzkopf, 296 pages SALE	$36.00
Practical Lessons in Metal Turning & Screwcutting, 178 pages	$30.80
Simple Workshop Devices by Tubal Cain, WPS No. 28, 140 pages	$18.95
Sir Joseph Whitworth "The World's Best Mechanician", 228 pages	$55.00
The Backyard Foundry by Terry Aspin, WPS No. 25, 90 pages	$18.95
The Beginners Guide to the Lathe by P. Marshall, 93 pages	$18.15
The Care and Operation of a Lathe (1942), 105 pages	$16.50
The Complete Handbook of Sand Casting by C.W. Ammen, 238 pp	$38.45
The Machinist's Bedside Reader, Projects, hints, tips, 210 pages	$49.50
The Machinist's Second Bedside Reader by G. Lautard, 213 pages	$53.90
The Machinist's Third Bedside Reader by G. Lautard, 250 pages	$68.20
Treatise on Milling and Milling Machines (1919), 409 pages	$30.80
Turning Lathes: A Guide to Turning, Screwcutting, etc, 432 pages	$48.40
Universal Milling Machines by Brown & Sharpe Mfg. Co., 94 pages	$13.20
Ways & Means (1892 machinist book), 158 pages	$22.00
Zeus Prescision Data Charts and Ref. Tables (Metric), 28 pages	$11.55
A Practical Treatise on Hot Air Engines by E.T. Westbury	$31.90
An Intro to Low Temperature Differential Stirling Engines, 88 pages	$24.20
An Introduction to Stirling Engines by James R. Senft, 80 pages	$21.45

We handle many other modeling, railway and metalworking books from the UK and the USA for a complete catalogue of over 6000 titles please send $2.25 (Payment may be by postage stamps).

Please allow 12-15 weeks delivery for some items. Payment can be made by Bankcard, VISA card, Mastercard, cheque or money order to:

Plough Book Sales

PO Box 14, Belmont, VIC, 3216

Phone (03) 5266 1262 Fax: (03) 5266 2180

Postage and Handling Charges

Order Value	Postage Charge
$0 - $10	$2.75
$10 - $20	$3.85
$20 - $60	$6.60
$60 - $165	$10.45
Over $165	Free